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INTERIM REPORT AIR, SOIL, WATER, AND HEALTH RISK ASSESSMENT IN THE VICINITY OF THE FMPC FERNALD, OHIO

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IT
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REPORT

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INTERNATIONAL
TECHNOLOGY
CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

INTERIM REPORT
AIR, SOIL, WATER, AND HEALTH RISK ASSESSMENT
IN THE VICINITY OF THE FMPC
FERNALD, OHIO

EXHIBIT C

ERRATA: TEXT

INTERIM REPORT AIR, SOIL, WATER, AND HEALTH RISK ASSESSMENT IN THE VICINITY OF THE FMPC FERNALD, OHIO

1.0 INTRODUCTION

Pg. 1-1 "National Lead of Ohio, Inc. (NLO), provided a Scope of Work to IT Corporation (IT), dated January 10, 1985, ..." should read January 10, 1986.

2.0 AIR TRANSPORT ASSESSMENT

Pg. 2-3 Wind rose for Greater Cincinnati Airport covers "30-year" not "31-year" period from "1949 through 1978" not "1948 through 1978"

"predominant wind direction for the 10- and 31-year periods" should read "predominant wind direction for the 10- and 30-year periods.."

Pg. 2-4 Section 2.2.4 - First sentence should read "Air quality monitors have operated at the FMPC almost continuously since 1960 (FMPC, 1960 through 1970 and 1973 through 1984)" not "...1980 through 1984)."

Pg. 2-7 References cited.

- Last reference should read "...October-November-December 1961" not "...October-November-December 1960"

Note: The months and days at publication appended to the references should be removed (See pp. 2-7 and 2-8)

Pg. 2-8 References cited.

- Last reference should be deleted and replaced with the following reference:

  U.S. Department of Commerce, 1979, "Class 7 Ceiling/Visibility Wind Graph for Greater Cincinnati Airport based on Average of Surface Observations from 1949 through 1978," prepared by the National Climatic for FAA under Interagency Agreement, DOT FA 79 WAI-057

3.0 SOIL DEPOSITION ASSESSMENT

Pg. 3-1 Section 3.3 - "severalfold" should read "several fold"

4.0 HYDROLOGY ASSESSMENT

Pg. 4-8 Section 4.2.2.6 - "...total pumping from these well fields averages over 37 million gallons per day" should read "...over 36 million gallons per day"

Pg. 4-13 Section 4.4.3.1 - last paragraph. The average of the upstream uranium values for the Great Miami River at the Ross (Venice) Bridge is lower than the 10 μg/l (6.8 pCi/l) value in the text. It is approximately 3.2 μg/l (2.2 pCi/l).

Pg. 4-13 Section 4.4.3 - "...on these and samples collected ..." should read "...on these and other samples collected..."

Pg. 4-13 Section 4.4.3.1 - Third paragraph "...the vicinity of New Haven Road (P-4) near its confluence..." should read "...the vicinity of New Haven Road (P-4) and near its confluence..."

Pg. 4-14 Section 4.4.3.2 - Second paragraph

"FMPC-13D and FMPC-18D had concentrations of 1.36 and 0.57 pCi/l, respectively" should read "FMPC-13D and FMPC-18D had concentrations of 0.91 and 0.57 pCi/l, respectively."

Pg. 4-15 Section 4.4.3.2, second sentence "...(contain elevated uranium..." should read "...(contains elevated uranium..."

Pg. 4-15 Section 4.4.3.3, fourth paragraph, "...was 2.55 ug/g (1.78 pCi/g)..." should read "...was 2.66 ug/g (1.80 pCi/g)..."

SECTION 5.0 - HEALTH RISK ASSESSMENT

Pg. 5-11 Referenced Cited

Last reference: "Transplutonium" should read "Transplutonic"

ERRATA: TABLES

Table 4-1 Major Ground Water Pumping Centers

- Reference to table should read "Miami Conservancy District, 1985," Hydrologic Data for the Hamilton-New Baltimore Area-1984," The Water Conservation Subdistrict of the Miami Conservancy District, Dayton, Ohio, 63 pages

Table 5-1 Health Effect Parameters for Acute and Chronic Exposure to Uranium Compounds

- ">0.2 mg/m^3 - NOAEL" should read ">0.2 mg/m^3 - LOAEL"
- "0.02% - LOAEL (uranyl nitrile)" should read "0.1% - LOAEL (uranyl nitrate)
- Under Chronic Exposure Duration Inhalations:

  Remove:
  "0.2 mg/m^3 LOAEL for (UF_6 + HF)"
  "0.5 mg/m^3 - NOAEL (UF_4)"

  Change:
  "0.1% of diet - LOAEL (UNH_4) Equivalent to a dose of 200 mg/mg" to "200 mg/kg - LOAEL (uranyl nitrate)

  "300 mg/m^3 - LOAEL (UF_4) to 1 mg/m^3 - LOAEL (UF_4)
- References: add "Stockinger, 1981"

ERRATA - FIGURES

Figure:

1-1 Vicinity Map Showing Site and Study Boundaries

- "Fork Road" should read "Dry Fork Road"
- "Route 127" should read "Route 27"

2-2 Wind Rose for Dayton Airport

- The wind rose pattern has been changed.

3-2 1986 Soil Sampling Sites

- Some locations have been changed.

4-6 IT Water and Sediment Sampling Points

- Legend "IT Wells" should read "IT Wells Sampled"

4-9 Maximum Area Potentially Affected by Surface and Ground Water Flow from the FMPC Site

- Uranium concentration in the Great Miami River should be greater than 2.2 pCi/l

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IN THE VICINITY OF THE FMPC
FERNALD, OHIO

1.0 INTRODUCTION

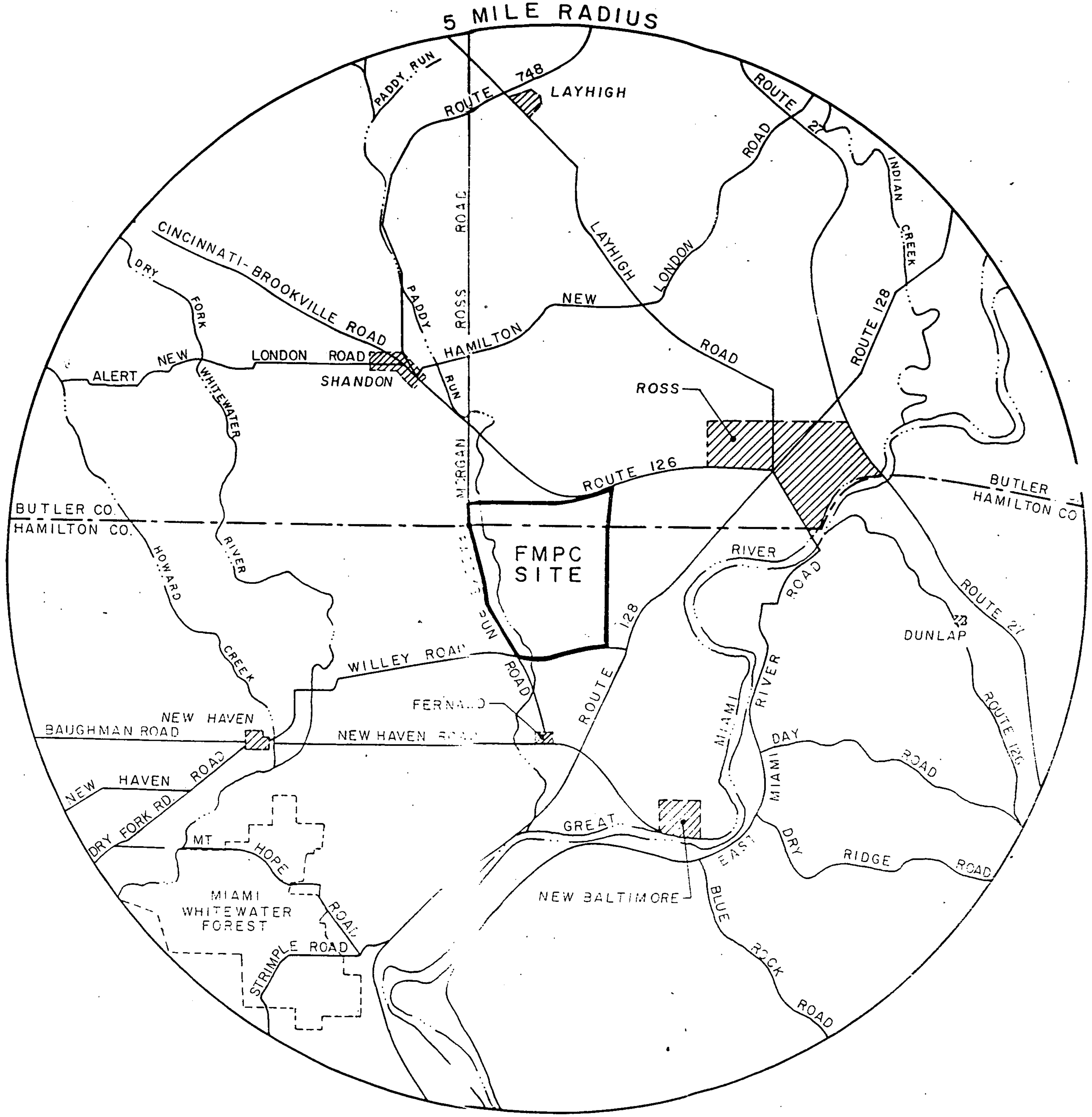
National Lead of Ohio, Inc. (NLO), provided a scope of work to IT Corporation (IT), dated January 10, 1985, wherein NLO has set forth anticipated tasks required of a technical consultant with respect to the Fernald Litigation.

The primary objectives of the scope of work subsequently developed by IT are to establish the geographic boundaries of off-site impacts, if any, from the Feed Materials Production Center (FMPC) and to assess the associated risks to the local community. This preliminary report concerning the extent of impact is based on information available as of April 12, 1986. A final report with IT's conclusions will be prepared at a future date.

The study area encompasses the region within a five-mile radius of the FMPC (Figure 1-1). The data review and data collection programs were designed to assist evaluation of the effects of airborne and waterborne emissions from the plant production and waste storage areas (Figure 1-2).

This preliminary report contains the following assessments:

- Air Transport Assessment (Chapter 2.0)
- Soil Deposition Assessment (Chapter 3.0)
- Hydrology Assessment (Chapter 4.0)
- Health Risk Assessment (Chapter 5.0).



SCALE

0 6000 12000 FEET

FIGURE I-I

VICINITY MAP SHOWING SITE AND STUDY BOUNDARIES

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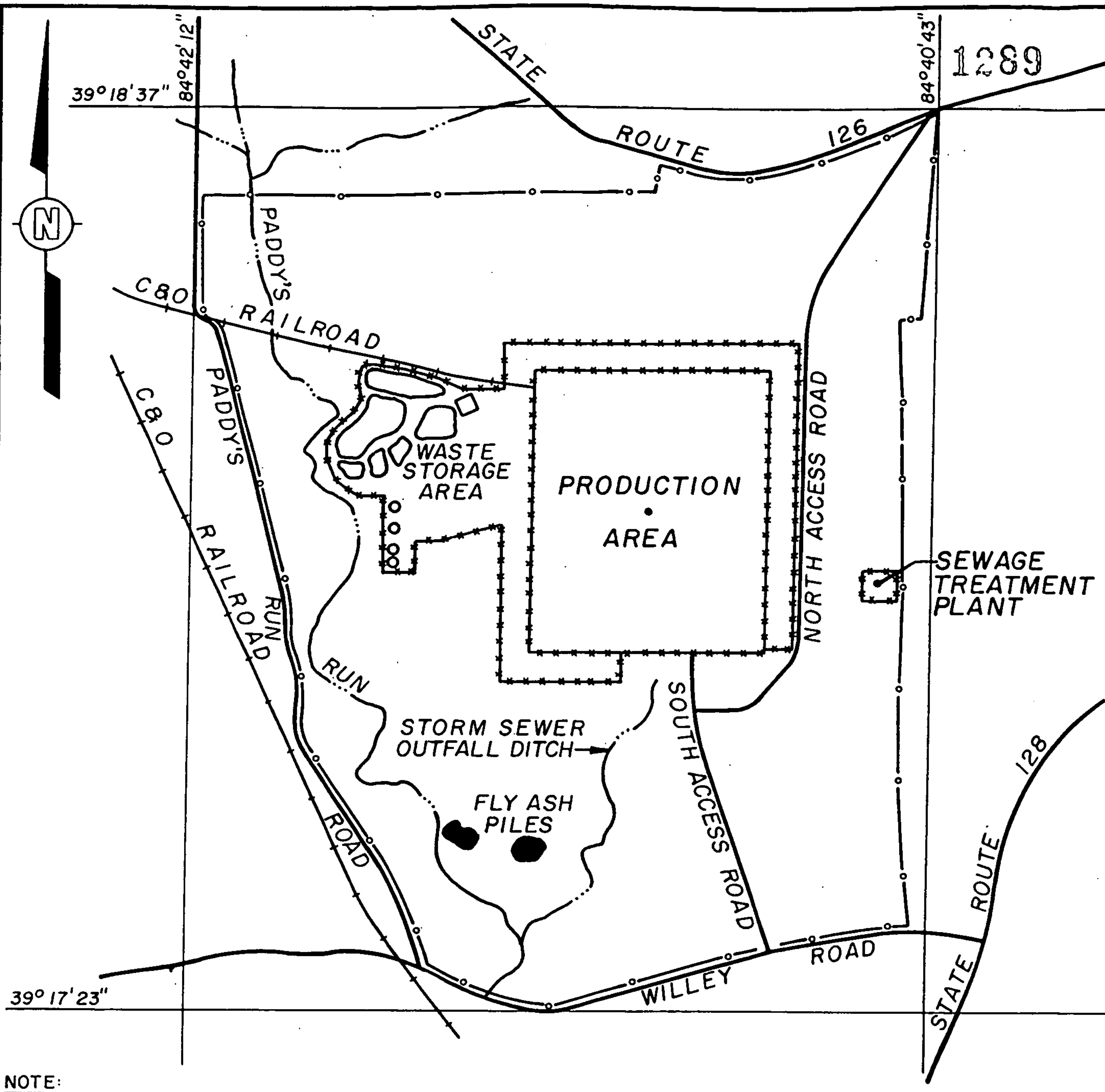

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NOTE:
COORDINATES AT CENTER OF PRODUCTION AREA:
LONGITUDE 84° 41' 19", LATITUDE 39° 17' 58".

LEGEND:
SECURITY FENCE
PROPERTY LINE FENCE
GRID LINE

SCALE
0 1500 3000 FEET

FIGURE 1-2

GENERALIZED FMPC SITE LAYOUT

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"Do Not Scale This Drawing"

2.0 AIR TRANSPORT ASSESSMENT

2.1 INTRODUCTION

The objective of this assessment is to reliably predict the atmospheric transport and dispersion of radioactive material (as uranium) released from the FMPC and to define the extent of the area surrounding the facility affected by these emissions. This assessment required the compilation of an inventory of FMPC emissions during its operating history, the selection of the most representative meteorological data from two nearby National Weather Service stations and the use of an atmospheric dispersion model which accounts for particle settling and deposition, and the effects of nearby buildings on dispersion.

2.2 REVIEW OF EXISTING DATA

2.2.1 Uranium Emission Inventory

An inventory of radionuclide emissions was compiled by the FMPC in November 1985 for the period 1951 through 1984 (Boback, et al., 1985). The inventory included stack parameters, building dimensions, and site plans depicting the location of the various emission sources. Additional information regarding the emission inventory was obtained from FMPC personnel (Boback, 1986).

Uranium was discharged from 110 stacks during the 34-year period of 1951 through 1984 and these emissions totaled approximately 120,000 kilograms (Boback, et al., 1985). Emissions from several of the stacks were quite small and these emissions were combined so that the number of sources included in the dispersion modeling could be reduced to save computational time. The following rationale was employed in combining the uranium discharge stacks. If several stacks were located on the same building and the emissions were not large from any single stack, all the emissions for that building were combined and released through a single stack. Stacks with larger emission rates were not combined with other stacks.

Following the above procedure, the 110 stacks were reduced to 36 representative point sources. These sources have a total emission rate of approximately 120,000 kilograms of uranium (Boback, et al., 1985).

In addition to the inventory prepared for the 34-year period, the emission data were scanned to determine the highest annual uranium emissions. According to these data, emissions of uranium were highest in 1955 and totaled approximately 21,000 kilograms (Boback, et al., 1985). This total is approximately six times greater than the average annual uranium emissions for the 34-year period.

2.2.2 Particle-Size Distributions

Particle-size information was obtained from tests conducted on 15 sources in 1984 (Boback, et al., 1985). Eleven of these are considered major sources. The actual particle-size distributions for these 11 sources were used in the dispersion modeling. For the remaining sources, the smallest particle-size distribution from the 15 tests was assigned.

2.2.3 Meteorological Data

2.2.3.1 Selection of the Most Representative National Weather Service Station

The closest National Weather Service station to the Fernald site collects data at the Greater Cincinnati Airport located near Covington, Kentucky. The airport is 16 miles south of the FMPC and is situated in gently rolling terrain about three miles south of the Ohio River. The average airport elevation is 860 feet and terrain to the west, south, and east ranges from 850 to 900 feet within three to four miles. Due north of the airport, within 2-1/2 miles, elevations are generally 850 to 880 feet. Beyond 2-1/2 miles to the north, the elevation drops to 455 feet, the elevation of the Ohio River. These topographic features would not affect flow conditions at the airport. The orientation of the Ohio River in this area is west-northwest to east-southeast. A wind rose for the Greater Cincinnati Airport (Figure 2-1) (U.S. Department of Commerce, 1985) does not indicate any predominance of wind direction along the axis of the river valley. The prevailing wind direction is from the south-southwest, which is quite typical for southwestern Ohio (U.S. Department of Commerce, 1968).

The elevation of the Fernald site is approximately 580 feet and the surrounding terrain to the west, south, and east of the site is relatively flat within 1-1/2 miles. North of the plant, beyond about 3/4 mile, the terrain slopes gradually from 600 to 800 feet. Within five miles of the plant, there are no significant topographical features which would alter the wind flow patterns at the FMPC.

Based on topographical considerations and the proximity of the Greater Cincinnati Airport, meteorological data recorded at the airport are expected to adequately reflect annual flow conditions at the Fernald site.

Previous studies conducted at the FMPC (Boback, et al., 1985; Kornegay and Sharp, undated) have used meteorological data from both the Greater Cincinnati and Dayton airports. Wind roses from both locations are quite similar (Figures 2-1 and 2-2) and the use of either station's wind speed, wind direction, and atmospheric stability data as input to the dispersion model produced similar results.

2.2.3.2 Period of Record

The FMPC started operations in 1951 and records indicate that emissions have occurred every year since then. To properly predict annual average uranium concentrations, meteorological data representative of this period should be used. The period of record should be long enough so that any anomalies in the data are minimized when the data are summarized for use in the dispersion model.

A wind rose for the Greater Cincinnati Airport covering the 31-year period from 1948 through 1978 (U.S. Department of Commerce, 1985) was compared to a 10-year wind rose covering the periods 1958 through 1962 and 1970 through 1974. The predominant wind direction for the 10- and 31-year periods was south-southwest and the wind directions with the lowest frequency of occurrence (north-northeast, east-southeast, and southeast) were the same for these two periods. Based on this comparison, the 10-year period (1958 through 1962 and 1970 through 1974) for the airport was used to model the transport and dispersion of FMPC emissions. Meteorological data for the Dayton Airport are also used in this preliminary modeling. The periods of record for the Dayton data are 1964, 1969 through 1974, and 1976.

2.2.4 Air Quality Monitoring Data

Air quality monitors have operated at the FMPC almost continuously since 1960 (FMPC, 1960 through 1984). From 1960 through 1970, monitors were located at the four corners of the fenced production area. These monitors were decommissioned after 1970 and six monitoring stations were established along the fenced property boundary. In 1981, an additional monitor was installed near the northwest corner of the property line (Figure 2-3).

Annual average uranium concentrations for the original network of four monitors were highest in 1960 and generally decreased to their lowest levels in 1970 (Figure 2-4).

The highest annual average uranium concentrations (Figure 2-5) measured at the property boundary occur at Samplers BS-1, BS-2, and BS-3 located downwind of the most predominant wind directions (west through south). The highest annual average uranium concentration [2.5×10^{-14} microCuries per milliliter (μCi/ml)] measured during the period 1973 through 1984 occurred at Monitoring Station BS-3. This concentration was 0.5 percent of the applicable U.S. Department of Energy (DOE) guideline.

2.3 ATMOSPHERIC DISPERSION MODEL

2.3.1 Model Selection

Emissions from the FMPC are released from short stacks located atop plant buildings. Under certain meteorological conditions (moderate or higher wind speeds), the emissions will be forced to the ground close to these buildings due to the wake formed on the leeside of these buildings. Also, the particle-size distribution of these emissions indicates that the larger particles have high settling velocities and will deposit on the ground close to their point of release.

In selecting an appropriate dispersion model, building wake effects as well as particle settling and deposition must be accounted for in the model algorithms. For this reason, the Industrial Source Complex (ISC) long-term dispersion model (Bowers, et al., 1979) was selected by IT. This is one of the U.S. Environmental Protection Agency's (EPA's) guideline models.

2.3.2 Model Capabilities and Features

The ISC dispersion model was used by IT to assess the effect of emissions on air quality from a wide variety of sources associated with an industrial complex such as the FMPC. For plumes comprised of particulates with appreciable gravitational settling velocities, the ISC model accounts for the effects on ambient particulate concentrations of gravitational settling and dry deposition. The ISC long-term model is a sector-averaged model that uses statistical wind summaries to calculate seasonal or annual ground level concentration or deposition values. A listing of the major features of the ISC model is contained in Table 2-1.

2.3.3 Model Options Used

The area surrounding the Fernald site is rural and the rural mode option was selected by IT for ISC model calculations. As stated previously, emissions from the FMPC are released from short stacks located on buildings and these emissions will be subject to building wake effects. This option, as well as the option to calculate plume rise as a function of downwind distance, was selected. Particle settling and deposition were taken into account.

2.3.4 Model Calculation Grid Network

Uranium concentrations were predicted at grid points placed at 0.5-kilometer intervals from the center of the FMPC out to 4.0 kilometers, and then at 1.0-kilometer intervals out to 8.0 kilometers. Additional points were located at each ambient air monitoring location. Ambient concentrations were calculated at 638 points.

2.4 PRELIMINARY RESULTS

Annual average uranium concentrations as predicted by the ISC long-term model used by IT were based on average annual emission rates to determine the most probable concentration which occurred during the period from 1951 through 1984. Average annual uranium emissions for the period were obtained by IT by dividing the total (approximately 120,000 kilograms) by 33 years rather than 34 years because emissions during the first year of FMPC operations were quite small. The modeling results show that the highest concentrations occur within the plant boundary. The highest predicted uranium concentration at the site boundary was 0.15 microgram per cubic meter ($\mu g/m^3$) and is equivalent to 2 percent of the applicable U.S. DOE guideline.

A second scenario was modeled to determine the predicted annual concentrations resulting from the highest annual uranium emissions which occurred during the period of 1951 through 1984. As discussed in Section 2.2.1, approximately 21,000 kilograms of uranium were released in 1955, or approximately six times the annual average for the period. Using this inventory and the same meteorological data as used in the first scenario, annual average concentrations were again predicted by IT. These results indicate that the highest predicted concentration at the site boundary would be 0.83 $\mu g/m^3$, or 11 percent of the applicable DOE guideline. These results show that if the maximum emission rate was used rather than an average for the period, predicted uranium concentrations would be less than one-third the DOE guideline. Similar results were obtained by IT when meteorological data for the Dayton Airport was used in the ISC model.

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Boback, M. W., K. N. Ross, and D. A. Fuchs, 1977, "Feed Materials Production Center Environmental Monitoring Annual Report for 1976," NLO, Inc., April 1.

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Kornegay, F. C. and R. D. Sharp, n.d., "Site Selection for Offsite Radiation Monitors at the Feed Materials Production Center Near Fernald, Ohio," Oak Ridge National Laboratory for the Oak Ridge Associated Universities.

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National Lead of Ohio, Inc., 1962, "Feed Materials Production Center Environmental Monitoring Quarterly Report for October-November-December 1960 and Summary Report for 1961," NLO, Inc., February 1.

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U.S. Department of Commerce, 1968, "Climatic Atlas of the United States," Environmental Science Services Administration, National Climatic Center, Asheville, North Carolina.

U.S. Department of Commerce, 1985, "Wind Rose for the Greater Cincinnati Airport, 1948-1978," National Climatic Center, Asheville, North Carolina.

TABLE 2-1

MAJOR FEATURES OF THE ISC MODEL

Polar or Cartesian coordinate systems

Plume rise due to momentum and buoyancy as a function of downwind distance for stack emissions(a,b)

Procedures suggested by Huber and Snyder(c) and Huber(d) for evaluating building wake effects

Procedures suggested by Briggs(e) for evaluating stack-tip downwash

Separation of multiple point sources

Consideration of the effects of gravitational settling and dry deposition on ambient particulate concentrations

Capability of simulating line, volume, and area sources

Capability to calculate dry deposition

Variation with height of wind speed (wind-profile exponent law)

Consideration of time-dependent exponential decay of pollutants

(a)Briggs, G. A., 1971, "Some Recent Analyses of Plume Rise Observations," in Proceedings of the Second International Clean Air Congress, Academic Press, New York.

(b)Briggs, G. A., 1975, "Plume Rise Predictions," in Lectures on Air Pollution and Environmental Impact Analysis, American Meteorological Society, Boston, Massachusetts.

(c)Huber, A. H. and W. H. Snyder, 1976, "Building Wake Effects on Short Stack Effluents," Preprint Volume for the Third Symposium on Atmospheric Diffusion and Air Quality, American Meteorological Society, Boston, Massachusetts.

(d)Huber, A. H., 1977, "Incorporating Building/Terrain Wake Effects on Stack Effluents," Preprint Volume for the Joint Conference on Applications of Air Pollution Meteorology, American Meteorological Society, Boston, Massachusetts.

(e)Briggs, G. A., 1973, "Diffusion Estimates for Small Emissions," ATDL Contribution File No. (Draft) 79), Air Resources Atmospheric Transport and Diffusion Laboratories, Oak Ridge, Tennessee.

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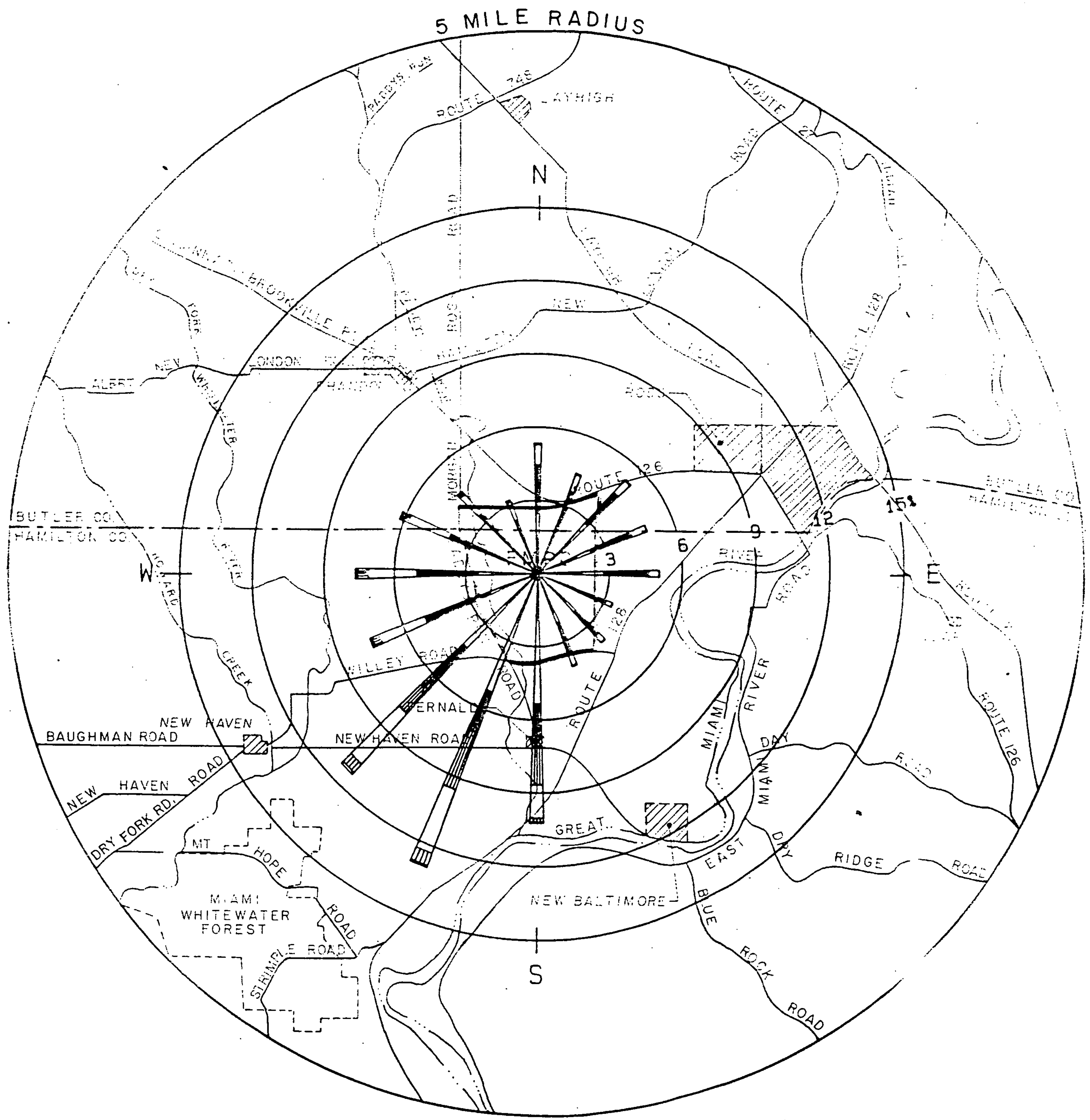

LEGEND:

1-3 4-6 7-10 11-16 17-21 >21

WIND SPEED CLASSES
(KNOTS)

SCALE
0 6000 12000 FEET

FIGURE 2-1

WINDROSE FOR GREATER CINCINNATI AIRPORT (1958-1962, 1970-1974)

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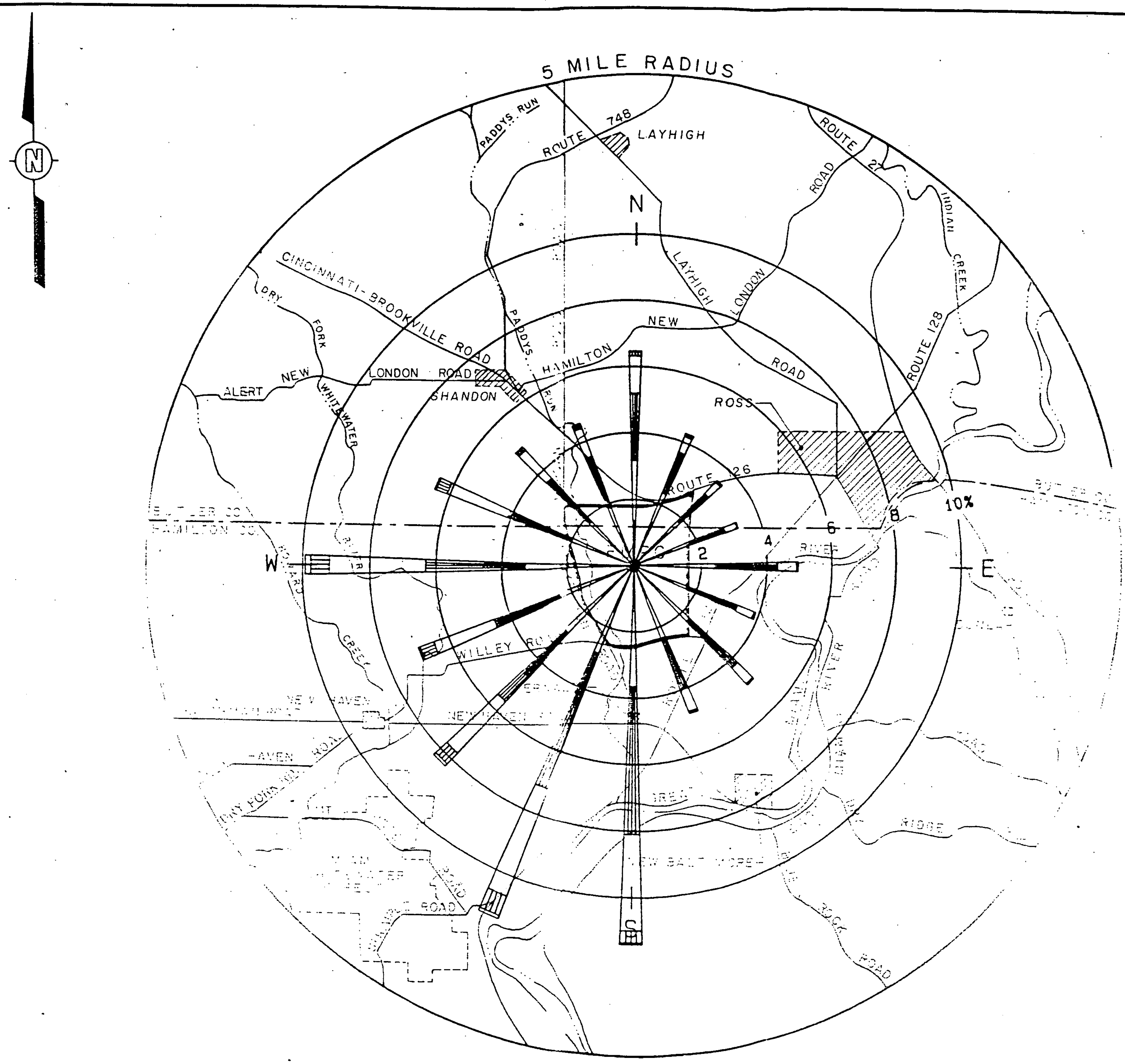

LEGEND:

1-3 4-6 7-10 11-16 17-21 >21

WIND SPEED CLASSES
(KNOTS)

SCALE

0 6000 12000 FEET

FIGURE 2-2

WINDROSE FOR DAYTON
AIRPORT (1964, 1969-1974, 1976)

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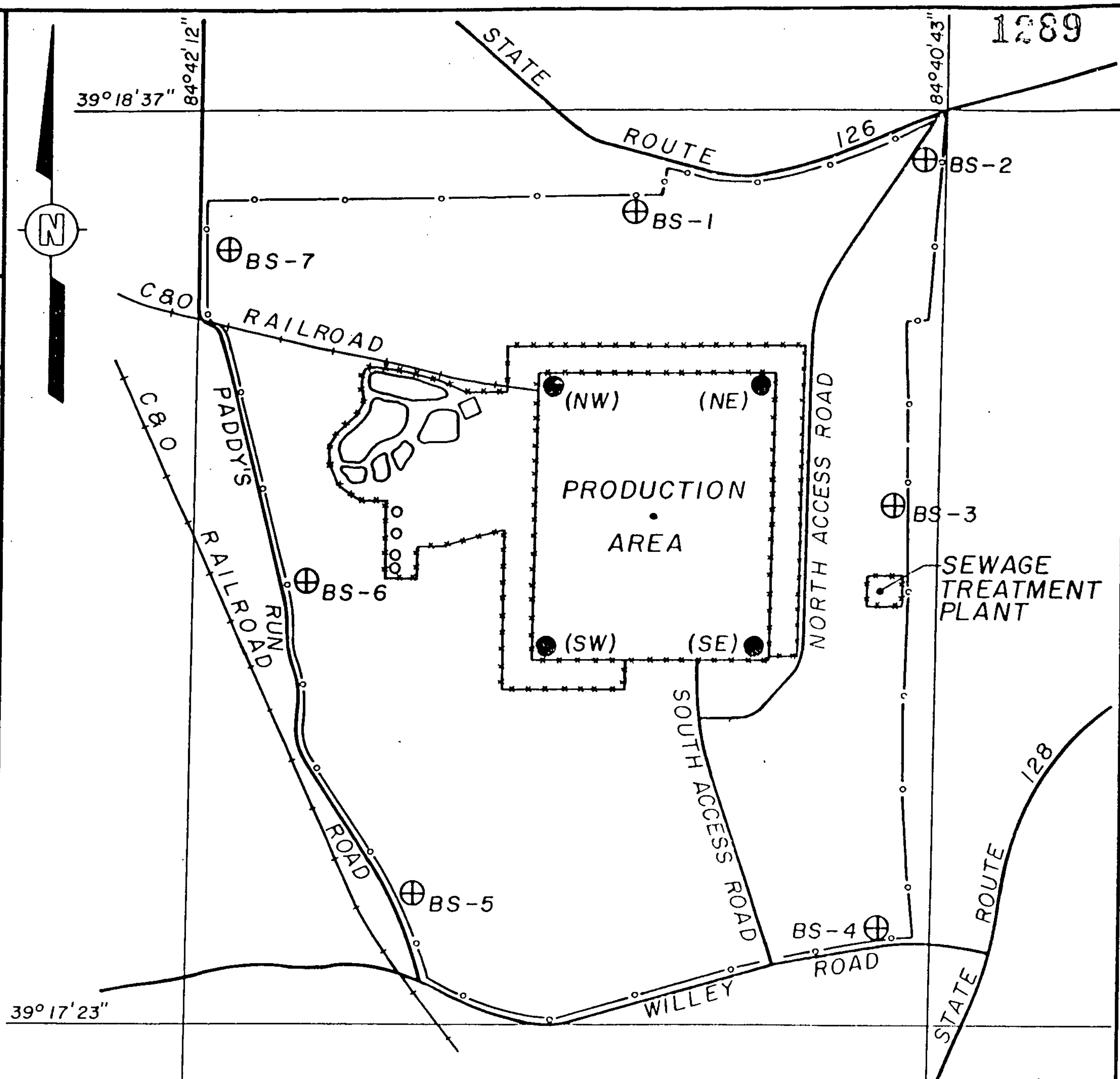
CHECKED BY TMH

APPROVED BY 4/15/86



NOTE:
COORDINATES AT CENTER OF PRODUCTION AREA:
LONGITUDE 84° 41' 19", LATITUDE 39° 17' 58".

LEGEND:
- SECURITY FENCE
- PROPERTY LINE FENCE
- GRID LINE
- (SE) AIR QUALITY MONITOR SITES 1960-1970
- BS-5 AIR QUALITY MONITOR SITES AFTER 1970

SCALE
0 1500 3000 FEET

FIGURE 2-3

LOCATION OF AIR QUALITY MONITORING STATIONS

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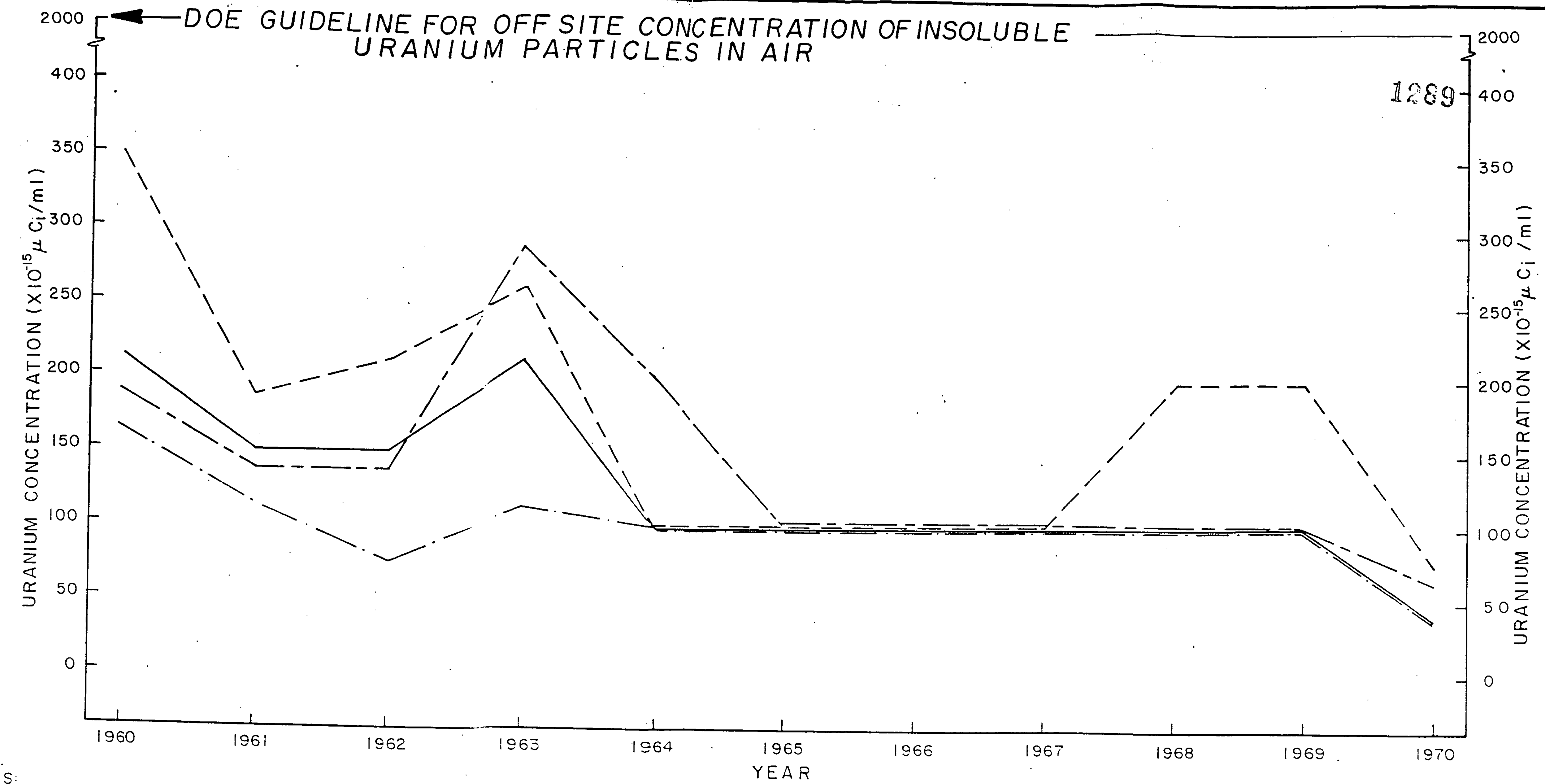

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△ GENERAL REVISION 6·9·86

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FIGURE 2-4

ANNUAL AVERAGE URANIUM CONCENTRATION FOR MONITORED SITES BY YEAR

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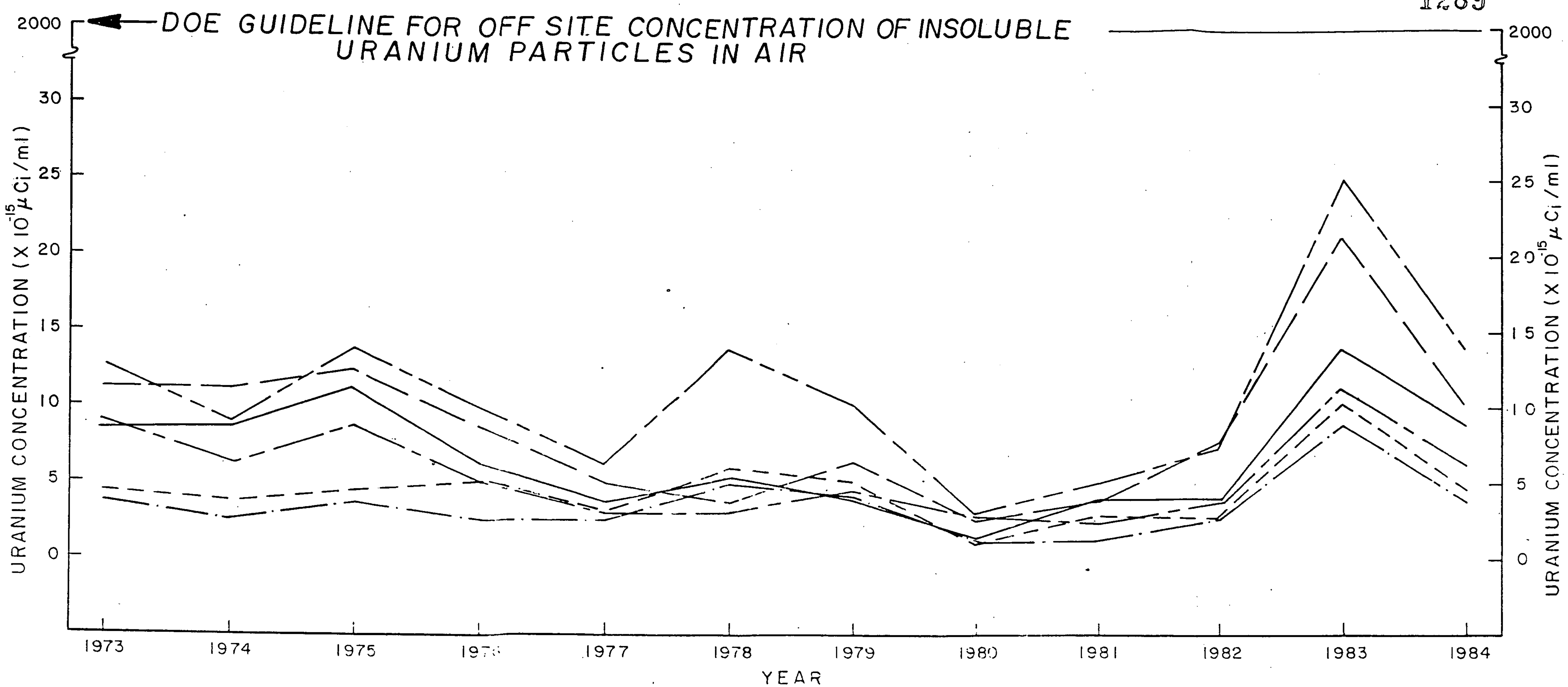
1289



REVISIONS:

⚠ GENERAL REVISION 6·9·86

LEGEND:

- BS-1
- BS-2
- BS-3
- BS-4
- BS-5
- BS-6

FIGURE 2-5

ANNUAL AVERAGE URANIUM CONCENTRATION FOR MONITORED SITES BY YEAR

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3.0 SOIL DEPOSITION ASSESSMENT

3.1 INTRODUCTION

The objective of this assessment is to describe the concentration of uranium in the surface soils surrounding the FMPC site. This assessment requires the compilation of existing data regarding soil concentrations of uranium, verification of these data for use in subsequent geostatistical analysis, and the collection of additional data necessary to provide a mapping of surface soil concentrations within a five-mile radius of the facility.

3.2 REVIEW OF EXISTING SOIL SAMPLING DATA

Soil samples have been collected in the vicinity of the FMPC since 1973 (NLO, 1974, 1975, and 1976; Boback, 1977, 1978, 1979, 1980, and 1981; Fleming, 1982, 1983, and 1984). Until 1984, the soil samples were collected at a very limited number of locations and, therefore, these samples are of limited value in describing the concentration of uranium in soil aside from the specific site from which the sample was taken. In 1984, 138 soil samples were collected and analyzed for the mapping of uranium concentrations in soil which is reported in the NLO annual monitoring report for 1984 (Facemire, 1985). The locations of these soil samples are shown in Figure 3-1.

To make an independent assessment of the reported 1984 soil sampling data, several samples were taken by IT from locations near some of those chosen in 1984. Regression analysis of these paired observations showed that the 1984 data provide as good a description of the uranium concentration in the soil as the 1986 data collected by IT and can be used with confidence to describe the regional distribution of uranium in soil.

3.3 IT'S SOIL SAMPLING PROGRAM

The objectives of IT's soil sampling program are severalfold. First, a sufficient number of samples were collected in close proximity to locations sampled in 1984 to independently establish confidence in the 1984 data. Second, the variability among uranium concentrations within a small area (four square meters) was to be investigated by the collection of nine samples at the node points of a 2-by-2-meter grid at two locations. These locations were specifically chosen to represent an area of observed high concentration [EG&G Energy

Measurements (EG&G) Site 10] and observed low concentration (EG&G Site 1) (Shipman, 1985). Third, as the major objective of the soil sampling program was to widen the area of assessment of the regional distribution of uranium in soil surrounding the FMPC, samples were collected to enable such an assessment, when combined with appropriate historical data, out to a five-mile radius from the FMPC. Fourth, the sampling program was conducted in such a manner as to permit investigation of variation in uranium concentration with depth of soil down to 15 centimeters. In addition to the collection of soil samples, samples of vegetation were also collected at each location, where feasible, to facilitate an assessment of the relationship between uranium concentrations in the soil and surface vegetation. Nine hundred and thirty-nine soil samples have been collected at 311 locations as of April 12, 1986. These locations are presented in Figure 3-2. Vegetation samples were taken at 235 of these locations.

3.4 GEOSTATISTICAL ANALYSIS OF SOIL SAMPLING DATA

A standard approach to investigating the spread of radionuclides over a geographical region consists of mapping the concentrations of the radionuclides and determining possible trends from an alleged source. Concurrently, the mapping will identify the geographic boundaries of migration.

Many standard mapping techniques, however, do not account for the patterns of spatial continuity specific to each plume and do not yield any measure of reliability. The geostatistical technique of linear kriging, a method by which data are weighted according to their spatial continuity to predict the level of concentration, provides a solution. The kriging technique makes use of the variogram, a structural function characterizing spatial continuity (similarity among points as a function of the distance between them), and provides an estimate of reliability. However, practice has shown that linear kriging does not perform well in the presence of highly skewed data distributions such as those commonly found in hazardous waste investigations. Variograms of concentration levels tend to be ill-defined and overinfluenced by extremes. More importantly, the reliability measures <u>do not</u> provide any confidence levels, i.e., no degree of certainty, and the assumption of a normal distribution of errors is unjustified.

The indicator and probability kriging approach, an application of linear 1289 kriging to estimate the conditional probability distribution of concentrations rather than the concentrations themselves, developed for mining applications, has dealt successfully with the estimation of highly skewed and highly variant spatial distributions of precious metal grades. This approach provides estimators which are confidence interval-qualified (degree of certainty) (Journel, 1983, 1984a, 1984b).

The applicability of this approach to investigations of the spread of hazardous material from a source has been demonstrated by Stanford University under contract to the U.S. EPA. The object of this demonstration project was to investigate the geographical distribution of lead concentrations in soil where the alleged source of lead was a smelter in Dallas, Texas (Isaaks, 1984).

The indicator approach to the estimation of spatial distributions consists of estimating the conditional probability distribution of any unknown concentrations. Estimates of this unknown concentration are then derived, together with their confidence intervals.

This conditional distribution method has several outstanding features for application to investigations such as the spread of radionuclides in the vicinity of FMPC:

- It is distribution free and resistant to extremes; hence, it can be applied to skewed data sets
- It yields confidence intervals which are not only data configuration-dependent but also data values-dependent
- It is reasonably simple in application and has been shown to perform unexpectedly well on the Dallas demonstration project.

3.5 PRELIMINARY RESULTS OF GEOSTATISTICAL ANALYSIS OF 1984 SOIL SAMPLING DATA

A preliminary geostatistical analysis of the soil sampling data collected during 1984 was conducted using the methods described in Section 3.4 of this report. A major objective of this analysis was to identify information gaps in the 1984 data which must be filled if mapping of the approximately 50,300-acre area defined by a five-mile radius from the FMPC site is to be accomplished. In addition, this preliminary analysis provided information on the requisite distance spacing between locations for the collection of additional soil samples. This distance was identified as approximately 2,400 feet.

The limits of geostatistical mapping based on the 1984 soil sampling data are shown in Figure 3-1 and encompass an area of approximately 13,000 acres, or one-fifth of the area of interest. Because the soil sampling sites selected in 1984 are concentrated near the boundary of the FMPC site, the adequacy of any mapping of soil concentrations from these data diminishes as the distance from the site increases. In addition, the 1984 data provided evidence of variation in uranium concentration on the order of 10 picoCuries per gram (pCi/g) within very small geographic areas which warrant better definition through additional sample collection prior to mapping.

The preliminary analysis has identified an area of approximately 247 acres, where there is a 25 percent or greater chance that a concentration of 20 pCi/g will be exceeded. Of this 247 acres, approximately 62 acres are outside the boundary of the site to the east. Conversely, there is less than a 25 percent chance that a concentration of 20 pCi/g or greater will be found elsewhere off the FMPC site and within the limits of geostatistical mapping referred to above.

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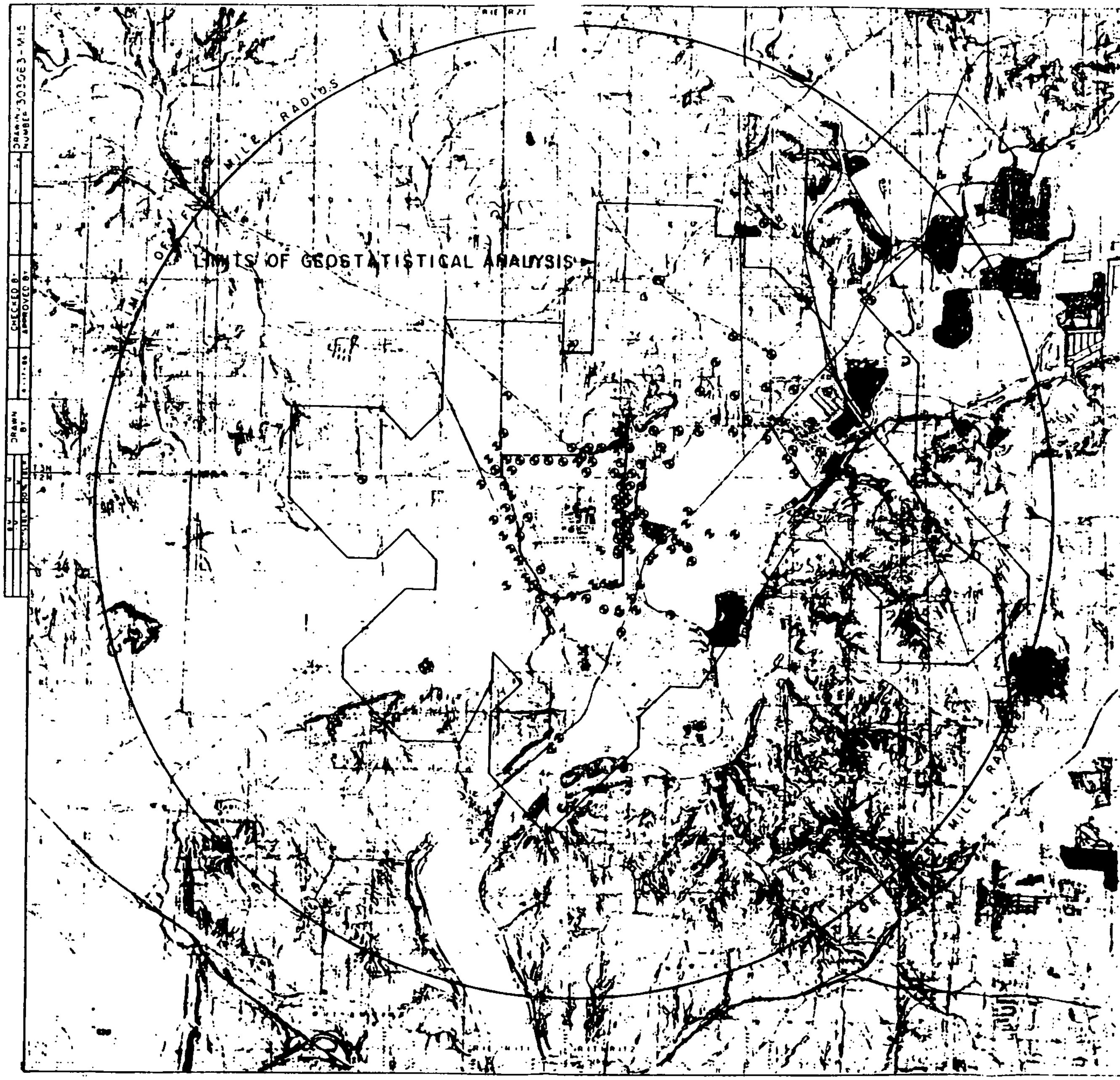

LEGEND

FIGURE 3-1

1984 SOIL SAMPLING SITES

FERNALD LITIGATION
DEPARTMENT OF ENERGY

IT Creating a Safer Tomorrow

33

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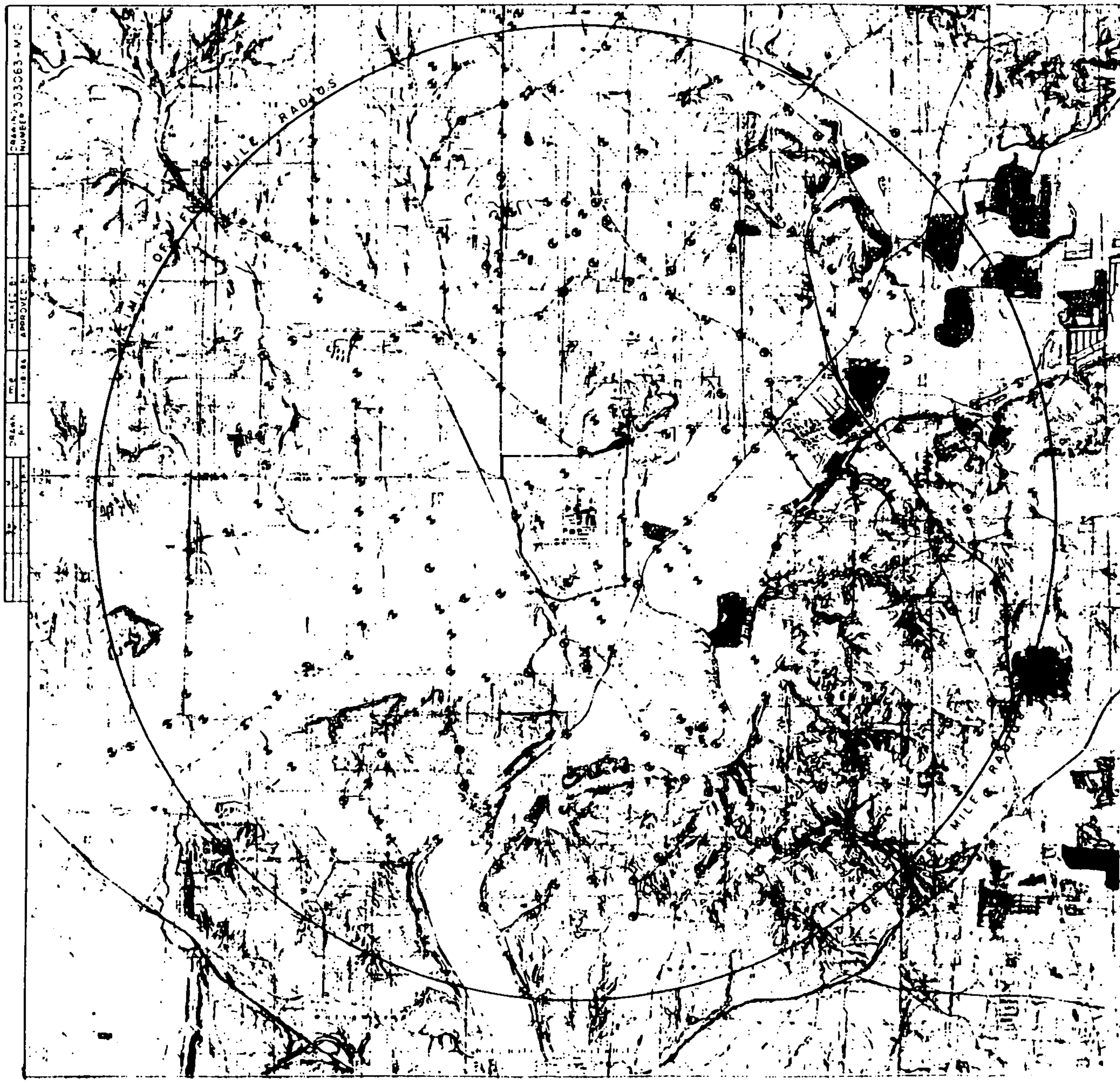

LEGEND

APPROXIMATE LOCATION SOIL SAMPLE

FIGURE 3-2

1986 SOIL SAMPLING SITES

Creating a Safer Tomorrow

1289

4.0 HYDROLOGY ASSESSMENT

4.1 INTRODUCTION

The objectives of the hydrology assessment are:

- Review and evaluate existing hydrologic, hydrogeologic, and geochemical data
- Define the boundaries of the buried channel aquifer(s) within the study area
- Determine the direction(s) of ground and surface water movement
- Perform an assessment of ground water quality in the vicinity of the FMPC.

To meet the objectives of the study, the following tasks were performed:

- Drilling and installing six new monitoring wells near the eastern and southeastern boundary of the FMPC
- Sampling of ground water from the new and selected existing wells
- Collecting surface water samples from waterways and outfalls
- Sampling of stream bed sediments
- Analyzing the samples for selected radionuclides and other organic and inorganic constituents.

4.2 REVIEW OF EXISTING DATA

4.2.1 Introduction

The sources, migration pathways, and receptors of site-associated chemical constituents must be identified to perform a hydrologic investigation and to define the impact of past and present plant operations on surface and ground water quality. Several possible on-site sources have been identified, including the waste pit areas, the fly ash piles, and the plant production area (Figure 1-2) (Dames and Moore, 1985). Off-site migration of chemical constituents may occur by several mechanisms. To adequately characterize the ground water pathways, key hydrogeologic parameters such as the deposition, distribution, thickness, and permeability of the aquifer materials must be determined.

Review of existing information included the evaluation of site area physiography, climatology, hydrology, geology, and current and historical water usage. Records and publications of the U.S. Geological Survey (USGS), the Miami River Conservancy District, the Ohio Department of Health, the Ohio Environmental Protection Agency (OEPA), and the Ohio Department of Natural Resources (DNR) were reviewed for information about ground and surface water flows and quality. The U.S. Soil Conservation Service (SCS) records were reviewed for information about the physical and chemical properties of the area soils. Other important sources of information regarding the site and the surrounding area include documents issued by the DOE and its predecessor agencies. Data gathered during previous site investigations and site inspections by the U.S. Energy Research and Development Administration (ERDA) and DOE contractors were compiled and assessed.

The data review included:

- Determining the locations of existing monitoring wells
- Determining the types of surface and ground water chemical data available, including monitoring, production, and domestic well records and storm water and process discharge data
- Defining the local and regional ground water flow direction
- Defining the direction of potential chemical constituent migration.

4.2.2 Regional and Site Hydrologic Setting

This section will focus upon the hydrology and hydrogeology of the study area and chemical migration pathways as defined by previous investigations. The hydrogeology of the Great Miami River Valley has been studied by the USGS and the Ohio DNR (Spieker, 1968a and 1968b; Watkins and Spieker, 1971; Dove, 1961; and Dove and Norris, 1951). These studies and the IT field exploration program have been used to establish an understanding of regional ground water hydrogeology near the FMPC.

Reports of investigations which address ground water movement near the FMPC facility include those prepared by the USGS (Sedam, 1985), Dames and Moore

(1985), and GeoTrans, Inc. (1985). These reports provide in-depth summaries of geology and hydrogeology at the FMPC. The Dames and Moore and GeoTrans reports also include results of ground water flow modeling. Assumptions and results of this modeling have been reviewed to determine their applicability to assessment of potential downgradient ground water receptors.

4.2.2.1 Geologic Setting

The FMPC is located on glacial outwash sands and gravels which fill a two-mile-wide buried channel known as the New Haven trough near the FMPC (Figures 4-1 and 4-2). This trough contains a sand and gravel aquifer described in this report as the buried channel aquifer. The valley represents the course of an ancestral river which, during the glacial period, cut a channel into bedrock composed of shales with limestone interbeds approximately 200 feet below the present-day Great Miami River. Glacial meltwaters filled this valley chiefly with layers of sand and gravel, called valley train deposits, into which the Great Miami River has cut its present channel. In the vicinity of the facility, the sands and gravels are partially capped by a layer of glacial till. The till is a clay unit with interbedded sands and gravels. In the vicinity of Paddys Run, this material has been reworked by surface water and is primarily silty sands and gravels.

Topographically, the eastern boundary of the FMPC is situated at the edge of a terrace overlooking the floodplain of the Great Miami River to the east. The land surface of the terrace, upon which the facility is situated, slopes gradually to the southwest towards Paddys Run.

4.2.2.2 Ground Water Hydrology

Regional hydrogeologic environments of the buried channel aquifer have been investigated and reported extensively by the USGS. Spieker (1968a) has classified and mapped five major hydrogeologic environments in the Great Miami River Valley. A hydrogeologic environment describes a portion of an aquifer possessing hydrologic and geologic properties that differ from the properties of aquifers in adjacent areas. Of the five hydrogeologic environments in the Great Miami River Valley, four are relevant to a description of hydrogeologic conditions in the vicinity of the FMPC facility (Figure 4-3). Using the notation of Spieker (1968a), these environments are:

- Type I: Sand and Gravel Aquifer. No interspersed clay layers are present. Potential for induced stream infiltration exists. The Type I aquifer environment is further divided into a Type I-A-1 aquifer which is 150 to 200 feet or more thick and a Type I-A-2 aquifer which is less than 150 feet thick.

- Type II: Sand and Gravel Aquifer. Types II-A-1, II-A-2, II-B-1, and II-B-2 have been described; however, only Type II-A-2 has been determined to exist in the study area. This environment is less than 150 feet thick and recharge by induced stream infiltration is not available.

- Type III: Sand and Gravel Aquifer Overlain by Clay. The potential for induced stream infiltration does not exist. The transmissivity and storage properties are highly variable.

- Type V: Shale and Limestone Bedrock Overlain by Till. Relatively impermeable shale and limestone bedrock. Small water supplies are available.

The Type I aquifer environment is found along the floodplain of the Great Miami River to the south and east of the FMPC facility. The lithology of the aquifer consists principally of sand and gravel. Scattered lenses of clay or fine-grained material may exist anywhere in the environment; however, these lenses are not of sufficient thickness or areal extent to act as semiconfining layers or otherwise affect ground water movement. The Type I aquifer may be classed as unconfined with a storage coefficient in the range of 0.2 to 0.25.

The Type II aquifer environment is characterized by 150 to 200 or more feet of sands and gravels with no areally extensive interstratified clay layers present. Recharge by induced stream infiltration is not available. The coefficient of storage is about 0.2. Large ground water supplies are not generally available from the Type II-A-2 aquifer due to its limited areal extent and proximity to bedrock valley walls.

The Type III aquifer environment is characterized by 50 feet or more of clayey till overlying the main buried channel aquifer. In the region of the FMPC, the buried channel aquifer is divided into an upper and lower part by a semi-pervious clay layer approximately 10 to 20 feet thick occurring approximately

140 feet below land surface. Hence, the lower aquifer is classed as a semi-confined or leaky confined aquifer. Spieker and Norris (1962) have estimated a coefficient of storage of 0.001 for the lower sand and gravel aquifer.

The Type V hydrogeologic environment includes all of the area outside of the buried channel. These areas are uplands which consist of shale with interbedded limestone bedrock overlain by 50 feet or less of clay-rich till. Large quantities of ground water are not generally transported through this material. Well yields vary widely, generally ranging from zero to ten gallons per minute. However, sand and gravel lenses are erratically distributed throughout this material and, in some cases, wells completed in these units may yield up to 50 gallons per minute.

The buried channel aquifer includes numerous interbedded clay or fine-grained lenses. These inhomogeneities result in very large variations of aquifer properties on a localized scale. However, the aquifer may be regarded as homogeneous for the purposes of this study since the hydrogeologic properties of interest occur on a much larger scale than these local variations. On the scale appropriate for characterizing ground water movement in the vicinity of the FMPC, aquifer properties have been previously established by aquifer pumping tests (Spieker, 1968a; Spieker and Norris, 1962; Dove, 1961).

Transmissivity values within the Type I-A-1 aquifer have been reported in the range of 300,000 to 500,000 gallons per day per foot (Spieker, 1968a). Based on an average saturated thickness of 150 feet, the range of horizontal hydraulic conductivity is approximately 270 to 450 feet per day. The Type I-A-2 aquifer would be expected to have similar hydraulic conductivity.

From an aquifer test, Spieker and Norris (1962) estimated the transmissivity of the lower sand and gravel aquifer below the FMPC to be about 140,000 gallons per day per foot. Using a thickness of 70 feet, the estimated horizontal hydraulic conductivity of the lower sand and gravel aquifer is approximately 270 feet per day.

Average annual precipitation at the FMPC for the years 1941 through 1970 was approximately 39 inches (NLO, 1977). Of the total annual precipitation, approximately 57 percent occurs during the spring and summer months. Most precipitation is lost through evapotranspiration. The remainder is lost through surface runoff or infiltrates to the ground water. Ground water recharge is low in summer months when evapotranspiration is high. Freezing of the ground also lowers recharge during a portion of the winter. For these reasons, most ground water recharge generally occurs during the months of October, November, March, and April. Average annual recharge has been reported by various authors in the range of 6 inches per year to as high as 21 inches per year for areas not overlain by clay. Average annual recharge within the Type I and Type III hydrogeologic environments has been estimated to be 15 and 6 inches per year, respectively (GeoTrans, 1985; Spieker, 1968a and 1968b). Ground water recharge by induced infiltration is significant along the Great Miami River near the Cincinnati and Southwestern Ohio Water Company (SOWC) well fields. Dove (1961) estimated the average rate of infiltration along the Great Miami River near the SOWC well field to be 240,000 gallons per day per acre of stream bottom.

4.2.2.3 Ground Water Flow

Ground water flow in the buried channel aquifer near the FMPC has been described by various authors. Spieker and Norris (1962) constructed a ground water level elevation contour map using data from 48 wells. They determined that a ground water divide existed along the eastern boundary of the FMPC. From their analyses, they concluded that ground water west of the divide moves from northwest of the facility near Shandon southeastward through the reservation towards the Great Miami River between New Baltimore and Paddys Run. These authors did not feel that the pumping of the on-site production wells influenced the regional ground water movement.

Sedam (1985) completed a well inventory and water level measurement survey in August 1982. From these measurements, he constructed a water table map of the area surrounding the FMPC. He also showed the north-south ground water divide along the eastern boundary of the FMPC and concluded that ground water moves from north to south across the facility and discharges to the Great Miami River between New Baltimore and Paddys Run. Sedam shows a cone of depression in the ground water table caused from pumping the plant wells. This pumping cone, as described, would capture a portion of the flow moving across the FMPC.

Dames and Moore (1985) produced a ground water contour map within the FMPC which shows west to east ground water movement which is influenced by the plant pumping. However, for their off-site ground water quality impact assessment, they used Sedam's (1985) evaluation of ground water flow.

GeoTrans (1985) questioned the USGS ground water divide location stating that water level elevations were determined by using surface elevations picked from topographic maps and not determined by an elevation survey and also that more wells were needed along the eastern site boundary. Through a ground water modeling study of the buried channel aquifer near the FMPC, GeoTrans concluded that:

- A ground water divide exists which trends from southeast to northwest across the south-central portion of the facility
- Water in the buried channel aquifer near the waste pits will travel east towards the Great Miami River
- Water south of the waste pits will travel south and southeasterly towards the Great Miami River.

GeoTrans recommended that additional wells be installed, especially to the east of the plant production area and that a well elevation survey be completed for the area. They also raised the question of vertical ground water gradients and the need for cluster wells to determine the magnitude of the ground water movement.

4.2.2.4 Surface Water/Ground Water Interaction

The main surface water drainage channel for the western portion of the site is Paddys Run, which empties into the Great Miami River (Figure 4-4). In addition to drainage to Paddys Run, a portion of the runoff from the production area has been collected and allowed to discharge to the Storm Sewer Outflow Ditch (SSOD). The SSOD is a natural gully that cuts through the south-central to southwest portion of the site (Figure 1-2). The SSOD empties into Paddys Run near Willey Road at the southwestern corner of the FMPC.

North of Willey Road, water in Paddys Run is elevated above the regional water table (GeoTrans, 1985). Somewhere between Willey and New Haven roads, water in Paddys Run lies below the water table and ground water discharges to Paddys Run. The exact location. where Paddys Run lies below the water table is seasonal. The location is probably farther south during months when ground water levels are lowest.

Dames and Moore (1985) theorized that surface water from Paddys Run and the SSOD, which contained above background concentrations of uranium, entered the ground water flow regime and that this was the most likely transport pathway by which uranium from the site reached off-site wells immediately south of the FMPC. This observation was supported by the similarity of uranium concentrations between waters released to Paddys Run and the SSOD and the observed concentration of uranium in off-site wells.

4.2.2.5 Shallow or Perched Ground Water Conditions

Surficial till at the FMPC consists of silty clay with interbedded sand, gravel, and silty sand lenses. Perched aquifer systems also exist within these units in different areas of the FMPC site. Investigations by Dames and Moore (1985) determined that hydraulic conductivities in the saturated till ranged from 0.2 to 2.5 feet per day. While the exact lateral extent of perched zones within the ground water system below the FMPC has not been established, it is unlikely that these zones provide direct ground water pathways for chemical constituents to reach off-site receptors. However, some of these perched systems may discharge to Paddys Run and to the buried channel aquifer.

4.2.2.6 Ground Water Usage

Ground water is a major source of water supply in the area. Major ground water users have been identified in the study area. These pumping centers are shown in Figure 4-5 and are listed in Table 4-1. The estimated total pumping from these well fields averages over 37 million gallons per day. Additionally, there are many other smaller industrial, commercial, agricultural, and private ground water users in the area.

4.3 IT SAMPLING AND ANALYSIS/DATA ACQUISITION PROGRAM

4.3.1 Introduction

The IT field program was designed to provide additional hydrologic, hydrogeologic, and geochemical data, which included:

- Drilling and installing monitoring wells
- Ground water level measurement surveys
- Well elevation and location survey
- Ground water sampling and analyses
- Surface water sampling and analyses
- Stream sediment sampling and analyses
- Cistern sampling and analyses
- Outfall sampling and analyses.

The sampling locations were selected so that ground water conditions could be determined upgradient and downgradient of the site. Sampling locations are shown in Figures 4-6 and 4-7.

4.3.2 Drilling and Monitoring Well Installation

Existing wells on site and off site were used as much as possible to determine the direction of ground water movement and ground water quality. However, preliminary analysis of the existing data base indicated a scarcity of wells east and southeast of the plant production facility. Therefore, six new monitoring wells were installed to provide water level and water quality data. Well construction techniques and testing followed the project sampling plan.

4.3.3 Ground Water Level, Well Elevation, and Location Surveys

A field survey of ground water levels and well elevations and locations was performed by IT to construct an accurate ground water elevation map.

A detailed well elevation, well location, and water level survey was required due to the uncertainty surrounding the location(s) of a ground water divide on the FMPC site. The field survey program was designed to determine the present location of this divide by collecting water levels over a relatively large area and establishing elevation control.

Depth to water measurements were made in 72 on-site and off-site wells during the period April 1 through 11, 1986. These data were obtained in accordance with procedures outlined in the sampling plan. Additionally, 18 water levels were obtained for selected wells on March 27, 1986 from SOWC.

Depth to water data were converted to water elevations using IT's well elevation survey. The water elevation data were used to construct a ground water elevation map to determine ground water flow directions and the location of the ground water divide.

4.3.4 Surface Water/Ground Water Sampling and Analysis

The sampling and analysis program was designed to provide data that would assist in determining the presence and mobility of various chemical constituents. A review of the literature for uranium, thorium, radium, strontium, and technetium was performed to determine the geochemical parameters governing radionuclide migration in natural waters. Organic, general chemical, and inorganic water quality parameters were also included in the analytical program to evaluate potential ground water migration of other chemical constituents.

Ground water samples were collected by IT from 12 on-site wells and 36 off-site wells for the purpose of expanding the existing data base and to provide information about additional ground water constituents. Wells were selected and analyses performed to determine the following:

- Background concentrations of general chemical, radiological, inorganic, or organic constituents
- Identification of general chemical, radiological, inorganic, or organic constituent concentrations.

Eleven surface water samples were collected from drainages upstream and downstream of the facility. Sampling locations can be seen in Figure 4-6.

Twelve sediment samples were collected by IT from drainages on or near FMPC both upstream and downstream of the facility. Sampling locations can be seen in Figure 4-6. These samples were analyzed for general chemical, radiological, inorganic, and/or organic constituents.

4.3.5 Cistern Sampling and Analysis

Six cisterns are being sampled by IT to determine if these water supplies were affected by airborne radionuclide emissions from the plant. The sites selected surround the FMPC so that an evaluation could be made about air deposition in various directions.

4.3.6 Outfall Sampling and Analysis

Samples were collected by IT from the SSOD at the weir and the main outfall discharge line at Manhole No. 175. The buried effluent line may also be leaking into the buried channel aquifer. These samples are being analyzed for general chemical, radiological, inorganic, and organic parameters.

4.4 PRELIMINARY ASSESSMENT

4.4.1 Introduction

For the preliminary assessment, IT has reviewed the existing data base and analyzed new analytical and field data available as of April 12, 1986. The data have been analyzed to assess the potential effects of the FMPC operations on ground and surface water quality. The emphasis of the preliminary analysis has been to:

- Determine the maximum area within the five-mile radius potentially affected by surface and ground water flows from the FMPC

- Determine the concentrations of chemical constituents in the surface and ground water in the vicinity of the FMPC.

This preliminary data evaluation is based on partial completion of the field and laboratory data collection effort. In making this assessment, no mitigating factors have been taken into account.

4.4.2 Hydrologic and Hydrogeologic Setting

Hydrogeologic and water table maps have been compiled and reviewed. From recently collected data and existing information, preliminary surface and ground water flow boundaries, ground water flow rates, flow directions, and potentially affected areas have been established (Figures 4-4, 4-8, and 4-9).

The buried channel aquifer is the primary ground water transporting unit and the aquifer of most concern to this study. Ground water flow directions in this aquifer in the FMPC area are variable, changing somewhat from location to location. Basically, there are three main components of flow: an easterly component in the northern portion of the facility, a southerly component south of the facility along Paddys Run, and a southeasterly component through the central plant area. Beyond these areas, beneath the Great Miami River, the ground water flow is toward the southwest. The direction of ground water movement is controlled by the pumping centers, the aquifer boundaries, and the regional gradient (Figures 4-5 and 4-8).

Ground water flow rates and directions in smaller perched and localized aquifer systems are quite variable. The ground water direction and rate of flow are controlled by the local aquifer properties and topographic relief. Ground water flow rates and directions in the bedrock are not generally known but have been assumed to be very low to zero, with a flow direction toward the buried channel aquifer (Spieker, 1968b; GeoTrans, 1985).

Drainages within the study area are shown in Figure 4-4. Of most importance to the study is Paddys Run, which is a north-south trending drainage lying within the central portion of the study area. It also drains the western edge of the FMPC. The water introduced to this drainage within the site boundary flows south and discharges to the Great Miami River. Portions of this drainage, especially within the site boundaries, are dry during periods of the year (Dames and Moore, 1985). Most of the surface water within the study area flows to the Great Miami River then to the southwest toward the Ohio River.

4.4.3 Present Geochemical Conditions

As part of the ongoing assessment program, samples of ground water, surface water, and sediments have been collected for chemical characterization (Section 4.3.4). Their locations are shown in Figure 4-6. All radiological analyses are being performed at the IT Radiological Sciences Laboratory (RSL) in Oak Ridge, Tennessee. Chemical and geotechnical analyses are carried out at the IT Analytical Services (ITAS) laboratory located in Export, Pennsylvania.

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Uranium analyses have been completed on samples collected during the weeks of March 2 and 9, 1986. The results of all other analyses on these and samples collected during subsequent periods will be presented in the final report.

4.4.3.1 Surface Water

Dames and Moore (1985) estimated upstream concentrations of uranium in Paddys Run to be between 2 and 4 micrograms per liter (µg/ℓ) [1 to 3 picoCuries per liter (pCi/ℓ)]. This estimate was based upon the results of samples collected from the vicinity of Route 126 north of the plant during 1979 to 1983. This location is approximately 4,500 feet upstream of the FMPC and receives no surface discharge from the site. An additional 37 samples were collected by NLO during 1985 with an average concentration of 2 µg/ℓ (1 pCi/ℓ) uranium. This level is within the reported range of concentrations observed in natural waters (Hem, 1970).

Samples of surface water were collected by IT at two on-site locations in Paddys Run (Samples P-2 and P-3). Uranium was present in Sample P-2 at 7.06 pCi/ℓ and in Sample P-3 at 5.18 pCi/ℓ.

Paddys Run was sampled by IT at three off-site locations (Figure 4-6). One upstream sample (P-1) was collected near Route 126 and two downstream samples were collected in the vicinity of New Haven Road (P-4) near its confluence with the Great Miami River (P-5). Uranium concentrations in Samples P-1 and P-4 were below the estimated upstream level of 1 pCi/ℓ. The most distant downstream sample (P-5) contained a level of uranium of 4.2 pCi/ℓ.

The headwaters of the Great Miami River are located approximately 100 miles northeast of the site. Because of its large drainage basin, concentrations of uranium will be different than those observed in local streams. Fifty surface water samples from the Great Miami River were collected at the Ross (Venice) Bridge (Route 126) at Ross in 1985. The average concentration was 10 µg/ℓ (6.8 pCi/ℓ). Because this sampling location is approximately two miles east and upstream of the FMPC, it is considered beyond the influence of surface drainage and discharges from the site.

Four surface water samples were collected by IT from the Great Miami River. The locations are as follows:

- R-1 - Ross Bridge (Route 126)
- R-2 - 200 feet downstream of the discharge outfall
- R-3 - New Baltimore
- R-4 - Confluence with Paddys Run.

Uranium concentrations in all four samples were found to be below the upstream average concentration of 6.8 pCi/ℓ for uranium. Two natural surface drainage (intermittent stream) samples located to the northeast of the site boundary (1W) and east of the site (2W) were analyzed for radiologic parameters. These samples contained 0.32 and 0.15 pCi/ℓ of uranium, respectively. These concentrations are below the estimated upstream levels determined for Paddys Run.

4.4.3.2 Ground Water

Background uranium concentrations in ground water were calculated by Dames and Moore (1985). Using 228 samples collected upgradient of the FMPC for the time period 1978 to 1982, the average background concentration for total uranium was 0.8 μg/ℓ (0.5 pCi/ℓ). Additional samples are being collected by IT from other upgradient locations to evaluate the representativeness of this number.

Uranium was analyzed in each of six on-site ground water samples collected by IT. Two of the samples slightly exceed the preliminary background concentration of 0.5 pCi/ℓ total uranium. FMPC-13D and FMPC-18D had concentrations of 1.36 and 0.57 pCi/ℓ, respectively.

Analyses are currently available for 17 off-site ground water samples collected by IT during the weeks of March 2 and 9, 1986. Uranium above the preliminary background level of 0.5 pCi/ℓ was detected in five wells completed in the buried channel aquifer. Four of the wells are located south of the site in an area that has previously shown elevated uranium levels (Dames and Moore, 1985). One well, located east of the site (SOWC Collector No. 2), has a uranium concentration of 1.22 pCi/ℓ.

Figure 4-9 delineates known areas within the buried channel aquifer with uranium concentrations exceeding the preliminary background level of 0.8 μg/ℓ (0.5 pCi/ℓ) in ground water. The figure also shows the maximum area within a five-mile radius of the FMPC potentially affected by surface and ground water flow from the FMPC. Another area is shown that may potentially be affected (contain elevated uranium concentrations above the preliminary background level). However, no data are available at this time to make an exact determination. These boundaries were established using available geochemical data, ground water level maps, aquifer boundary maps, and calculations of the possible rate/distance of ground water movement. In establishing these boundaries, no dilution or retardation of migrating chemical constituents was assumed. These conditions were assumed to exist over the entire period of plant operation.

4.4.3.3 Sediments

Average upstream uranium concentrations for sediments in Paddys Run were calculated by IT from 18 grab samples collected and analyzed by NLO from 1974 through 1983. All samples were collected on the FMPC site at the railroad bridge. The average concentration in these sediments as calculated by IT is 2.2 micrograms per gram (µg/g) (1.5 pCi/g).

IT samples of sediment from Paddys Run were obtained from on-site Sampling Locations P-2 and P-3 which were coincident with the surface water sampling locations. Uranium was detected at levels of 0.80 and 0.44 pCi/g, respectively.

One off-site sample from Paddys Run, P-5, was collected at a location coincident with the surface water sampling point. Uranium was detected at 0.70 pCi/g.

Sediment samples were collected by NLO over the period 1974 through 1983 from the Great Miami River at two upstream locations: Ross (Venice) Bridge (River Mile 25.6) and at the water collector (River Mile 27.8). The average uranium upstream concentration at Ross Bridge (17 samples) was 2.55 ug/g (1.78 pCi/g) and at the water collector 2.48 µg/g (1.66 pCi/g).

Four sediment samples from the Great Miami River were collected by IT for uranium analysis coincident with the surface water sampling locations. No levels above the preliminary upstream concentration were detected.

4.5 PRELIMINARY CONCLUSIONS

Existing hydrologic, hydrogeologic, and geochemical data were reviewed. Additionally, IT ground water elevation and water quality data collected by IT as of April 12, 1986 were reviewed and compiled. From this data base, IT has performed a preliminary evaluation of ground and surface water flow directions, ground water flow rates, and chemical migration beyond the boundaries of the FMPC. It was determined that:

- Surface water in the study area generally flows south toward the Great Miami River. Some areas in the southeast part of the study area drain north toward the Great Miami River.
- Major ground water flow is generally confined to the buried channel aquifer and generally drains toward the southwest.
- Water in the bedrock (Type V environment) in areas adjacent to the buried channel aquifer probably drains toward the buried channel aquifer.

The preliminary conclusions about surface and ground water quality in the study area are:

- Water in Paddys Run contains concentrations of uranium above the 1 pCi/ℓ level. Three water samples exceeded this level.
- The limited water quality data base for the Great Miami River contains no uranium values at or above the average upstream uranium concentration (6.8 pCi/ℓ).
- There are two areas where above preliminary background uranium concentrations (0.5 pCi/ℓ) are present in ground water in the buried channel aquifer:

  One area is east of the facility:

  - Collector No. 2 - 1.22 pCi/ℓ

  The other area is south of the facility:

  - Well No. WK - 0.68 pCi/ℓ
  - Well No. MVRM - 4.09 pCi/ℓ
  - Well No. HK-S - 144 pCi/ℓ
  - Well No. DS - 183 pCi/ℓ.

- The maximum area of chemical migration in ground water from the FMPC within the five-mile radius is confined to the buried channel aquifer which extends southwest.

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TABLE 4-1

MAJOR GROUND WATER PUMPING CENTERS

NAME OF WATER USER	TYPE OF WATER SUPPLY	NUMBER OF PEOPLE SERVED	AVERAGE WATER USAGE (MDG)(a)
Potable Water			
1. Cincinnati Bolton Plant	Municipal	760,000(b)	15.1
2. Fairfield	Municipal	33,000	1.72(c)
3. National Lead	Noncommunity	800	0.42
4. Water Association	Public	22,000	1.73
Nonpotable Water			
5. Southwestern Ohio Water Company	Industrial	13 Industries	17.38
6. Delta Steel	Industrial	1 factory	Undetermined
7. Albright & Wilson Chemical Co.	Industrial	1 plant	~0.14(d)
8. Ruetgers-Nease Chemical Company	Industrial	1 plant	~0.1(d)

(a)Million gallons per day.

(b)Includes people served from Ohio River water plant (approximately 90 percent).

(c)Well field is only partially in the study area.

(d)Information obtained by IT.

Reference:

1985, The Water Conservation Subdistrict of The Miami Conservancy District, Hydrologic Data for the Hamilton New Baltimore Area 1984

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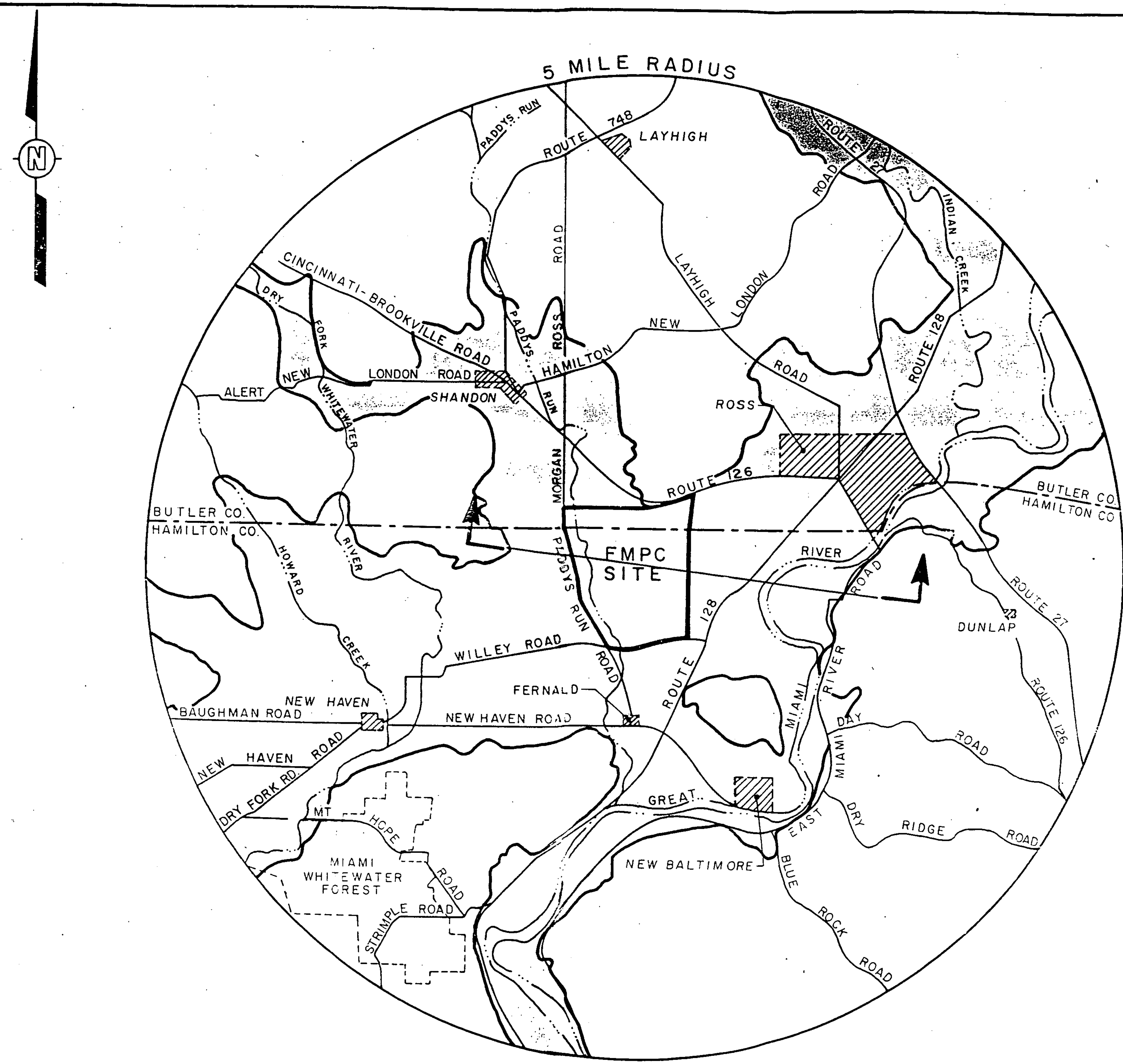

LEGEND:

BURIED CHANNEL AQUIFER

LINE OF CROSS SECTION REFER TO FIGURE 4-2

SCALE

0 6,000 12000 FEET

FIGURE 4-1

BURIED CHANNEL AQUIFER

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"Do Not Scale This Drawing"

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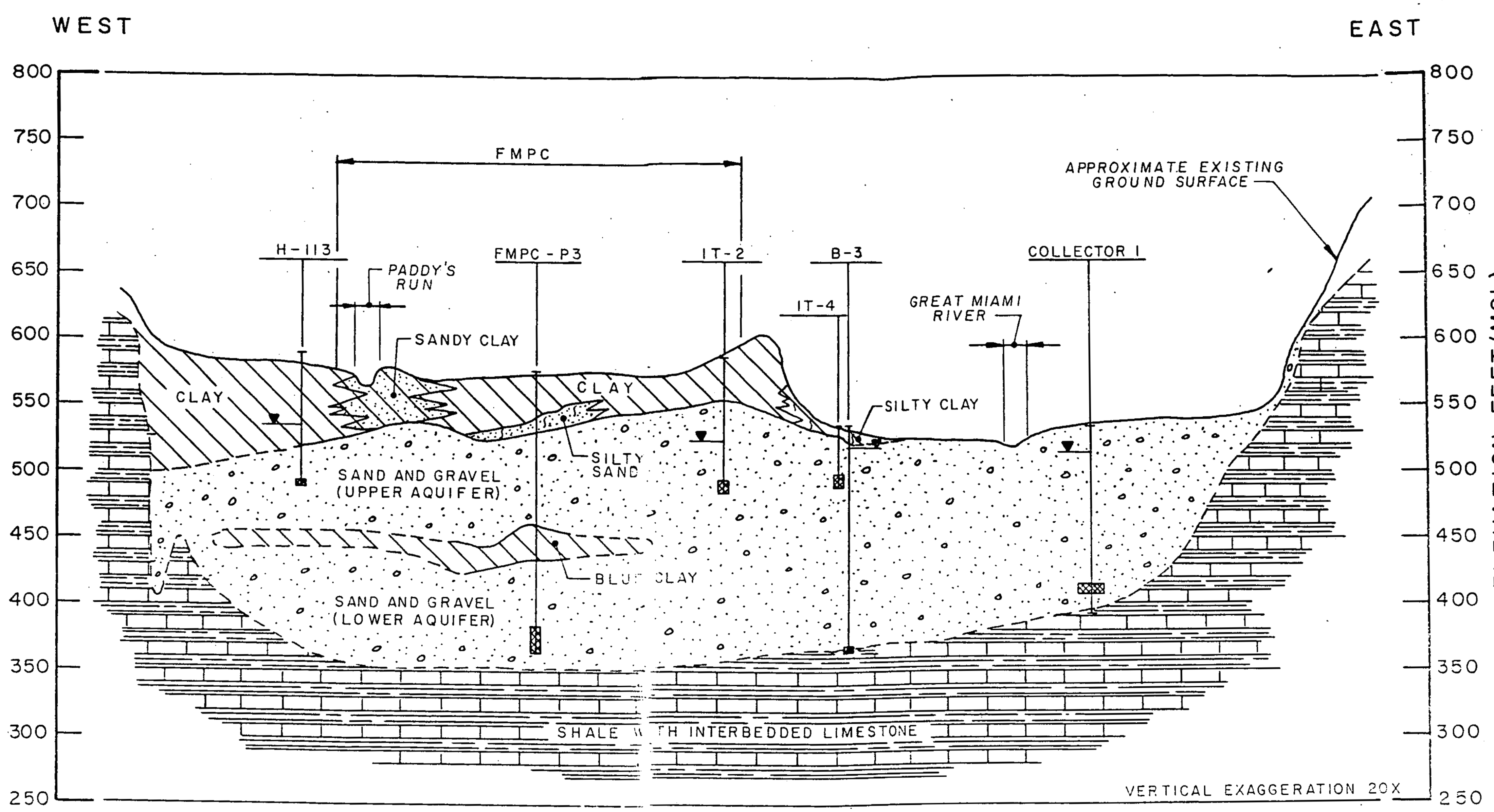

LEGEND:

OPEN INTERVAL

WATER LEVEL

NOTE:

1. FOR LOCATION OF SECTION SEE FIGURE 4-1

REFERENCE:

MODIFIED FROM U.S.G.S. PROFESSIONAL PAPER 605-A USING AVAILABLE OHIO STATE WATER WELL RECORDS, SOWC WATER WELL DATA, DAMES & MOORE FEED MATERIALS PRODUCTION CENTER GROUNDWATER STUDY TASK A & C REPORTS AND IT BORING LOGS

THE BORING LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SOIL CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING LOCATIONS. ALSO THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE BORING LOCATIONS.

THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE TEST BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE TEST BORINGS AND IT IS POSSIBLE THAT SUBSURFACE CONDITIONS BETWEEN THE TEST BORINGS MAY VARY FROM THOSE INDICATED.

GENERALIZED CROSS SECTION

(LOOKING NORTH)

VERTICAL SCALE

0 100 200 FEET

HORIZONTAL SCALE

0 2000 4000 FEET

FIGURE 4-2

GENERALIZED HYDROGEOLOGIC CROSS SECTION OF THE BURIED CHANNEL AQUIFER

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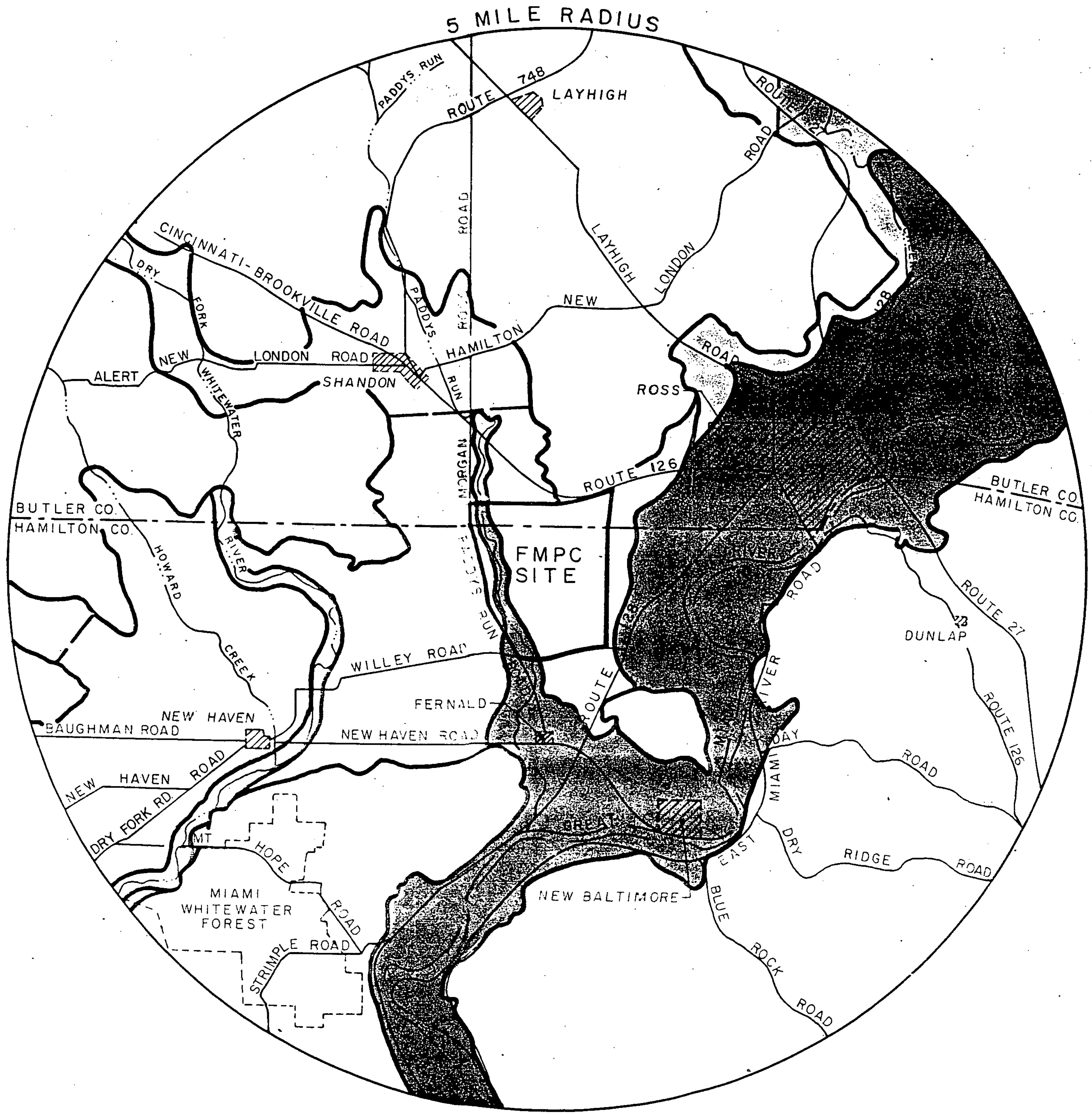

LEGEND:

- TYPE I
- TYPE II
- TYPE III
- TYPE V
- HYDROGEOLOGIC ENVIRONMENTS UNDETERMINED OR UNCHECKED

REFERENCE:
MODIFIED FROM GROUND WATER HYDROLOGY AND GEOLOGY OF THE LOWER GREAT MIAMI RIVER VALLEY OHIO, U.S.G.S. REPORT NO. 605-A USING SOIL SURVEYS OF BUTLER COUNTY (1980) AND HAMILTON COUNTY (1982) AND IT FIELD OBSERVATION

SCALE
0 6000 12000 FEET

FIGURE 4-3

HYDROGEOLOGIC ENVIRONMENTS

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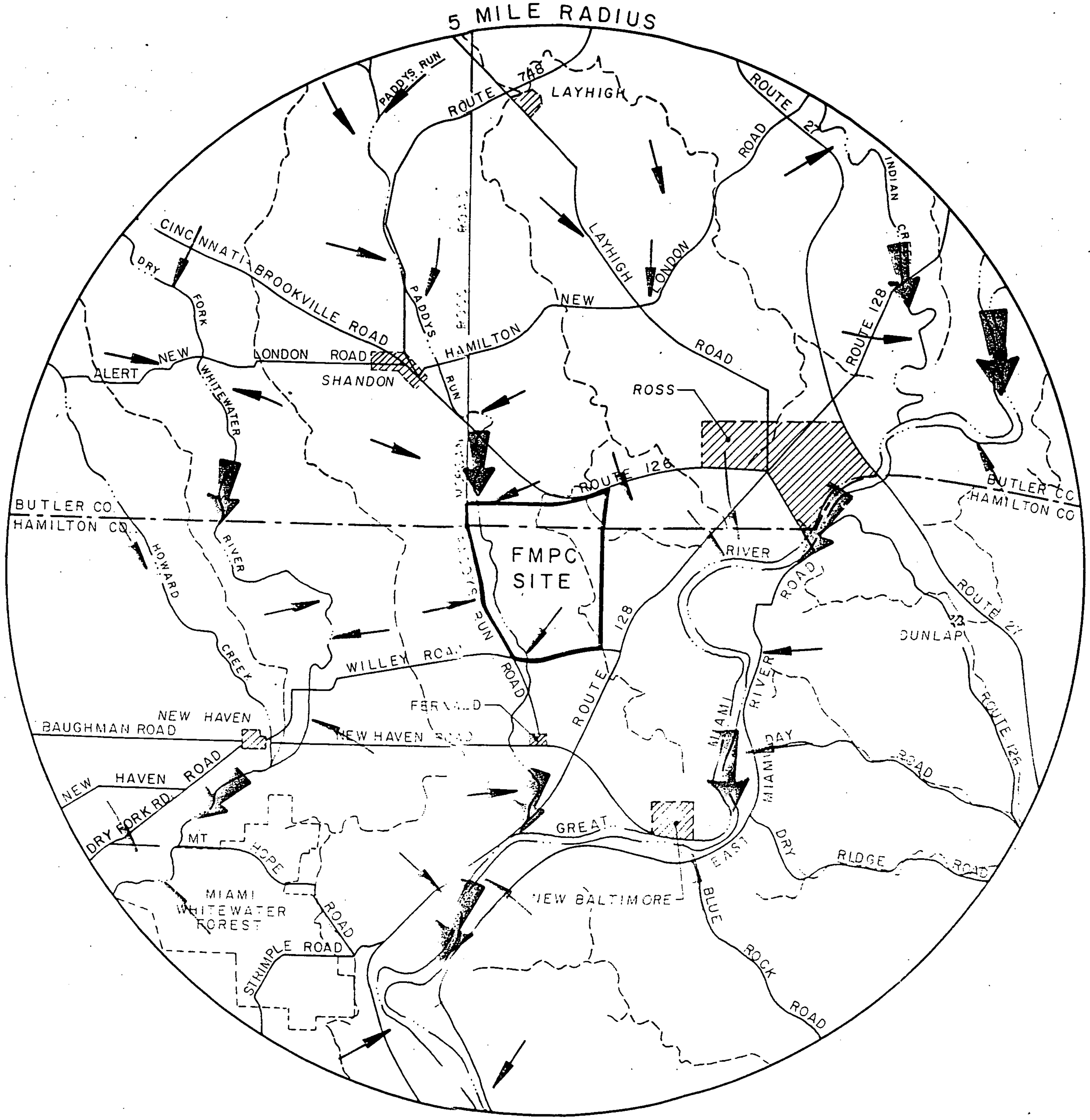
CHECKED BY APPROVED BY 4/15/86



LEGEND:

- PRIMARY DRAINAGE
- SECONDARY DRAINAGE
- MINOR DRAINAGE
- WATERSHED BOUNDARY

SCALE

0 6000 12000 FEET

FIGURE 4-4

GENERALIZED SURFACE WATER FLOW

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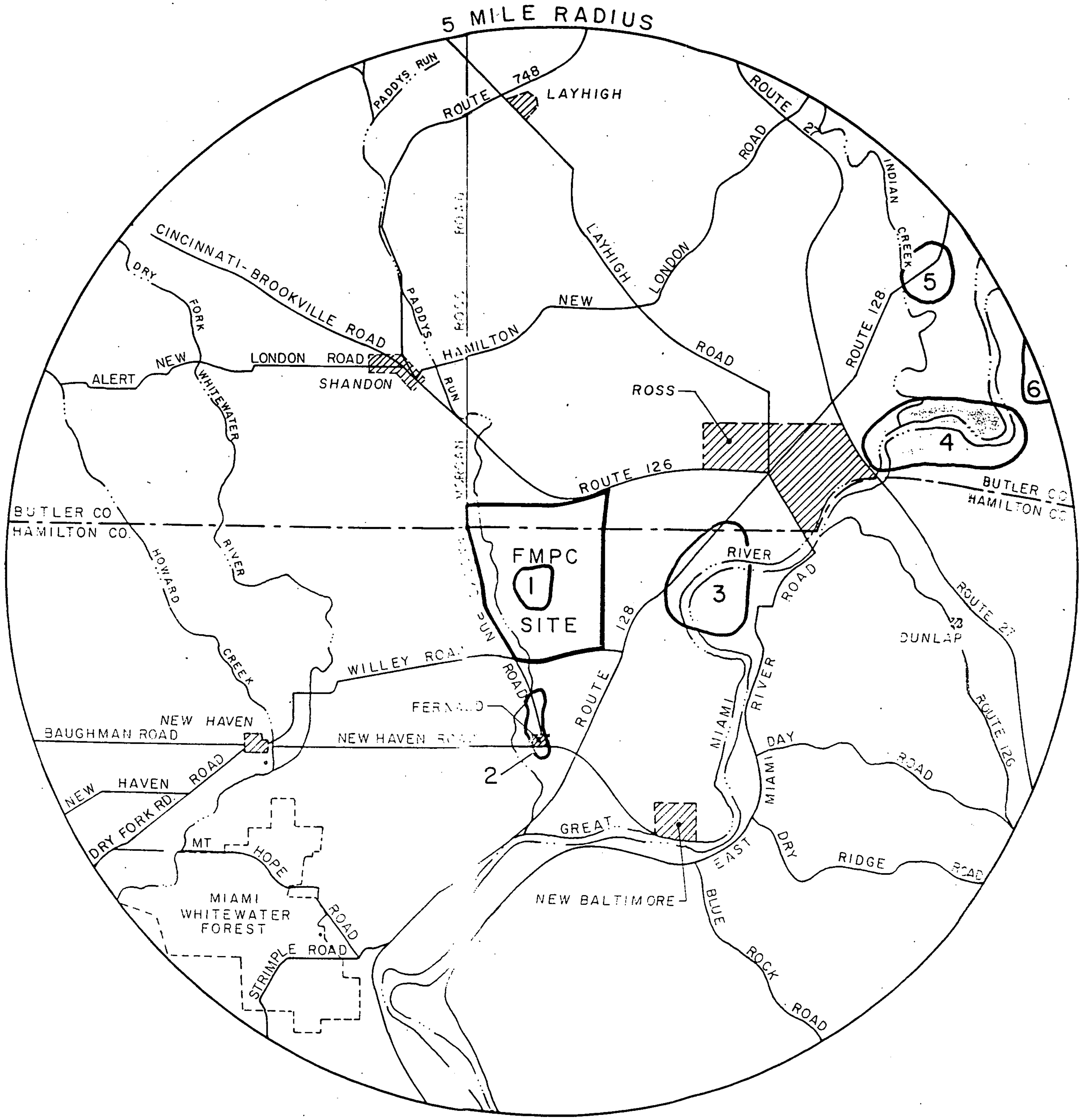

LEGEND:

1	FMPC SITE WELL FIELD (NATIONAL LEAD OF OHIO)
2	DELTA STEEL WELL, ALBRIGHT AND WILSON AND RUETGERS-NEASE WELL FIELD
3	SOUTHWESTERN OHIO WATER COMPANY WELL FIELD
4	CINCINNATI / BOLTON WELL FIELD
5	WATER ASSOCIATION WELL FIELD
6	FAIRFIELD WELL FIELD

NOTE:
MOST HOME OWNERS USE GROUND WATER FOR THEIR PRIMARY WATER SUPPLY

SCALE
0 6000 12000 FEET

FIGURE 4-5

MAJOR GROUND WATER PUMPING AREAS

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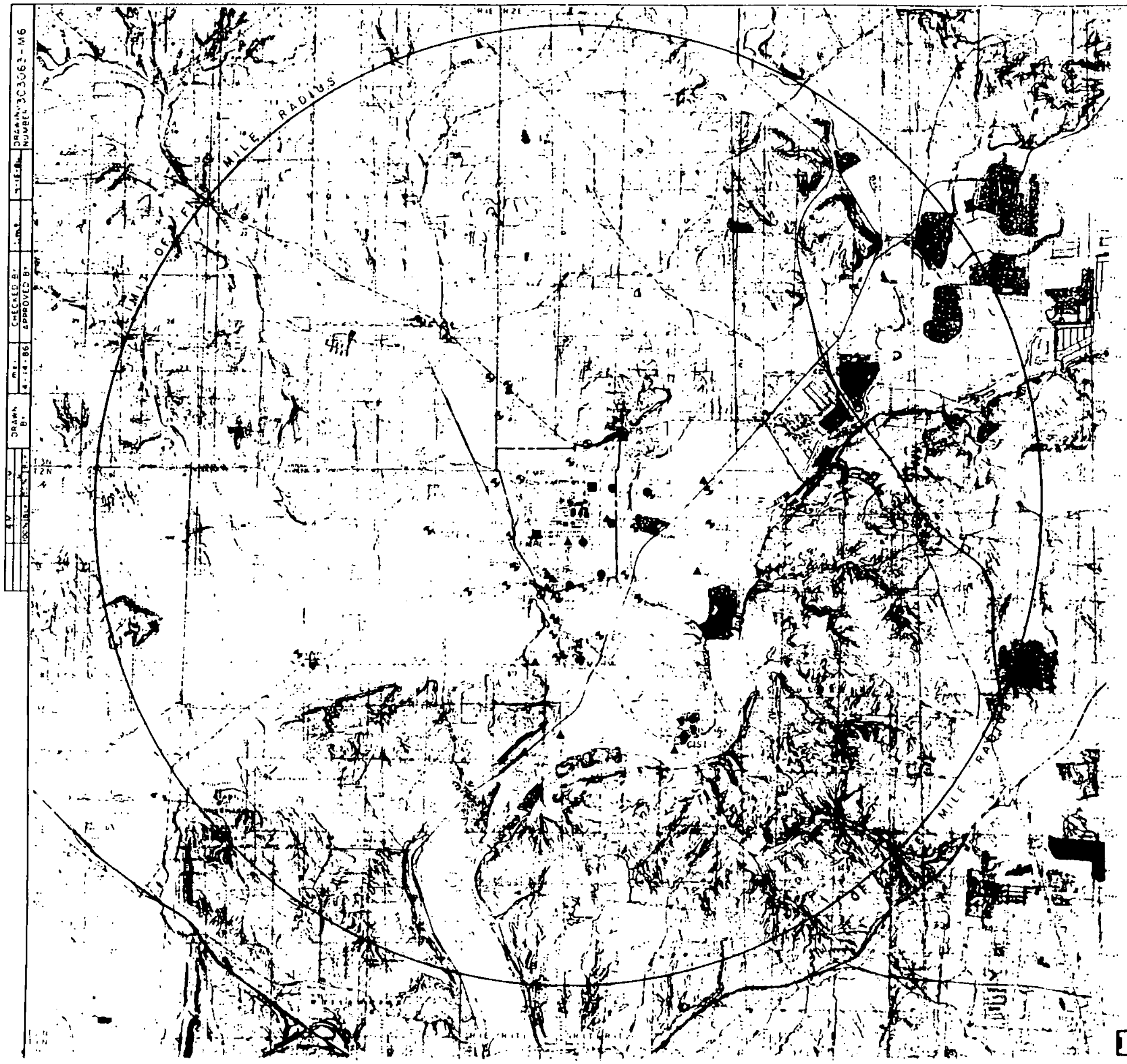

NOTES:

WELL LOCATIONS ARE APPROXIMATE

CISTERN 2 NORTH OF FIVE MILE RADIUS

R2W
R1E

LEGEND

▲ SURFACE WATER AND SEDIMENT LOCATIONS

ON-SITE PRODUCTION WELL SAMPLES

WELLS SAMPLED (SINGLE WELL LOCATIONS)

■ WELL CLUSTERS SAMPLED

● IT WELLS SAMPLED

CISTERN LOCATIONS

FIGURE 4-6

IT WATER AND SEDIMENT SAMPLING POINTS

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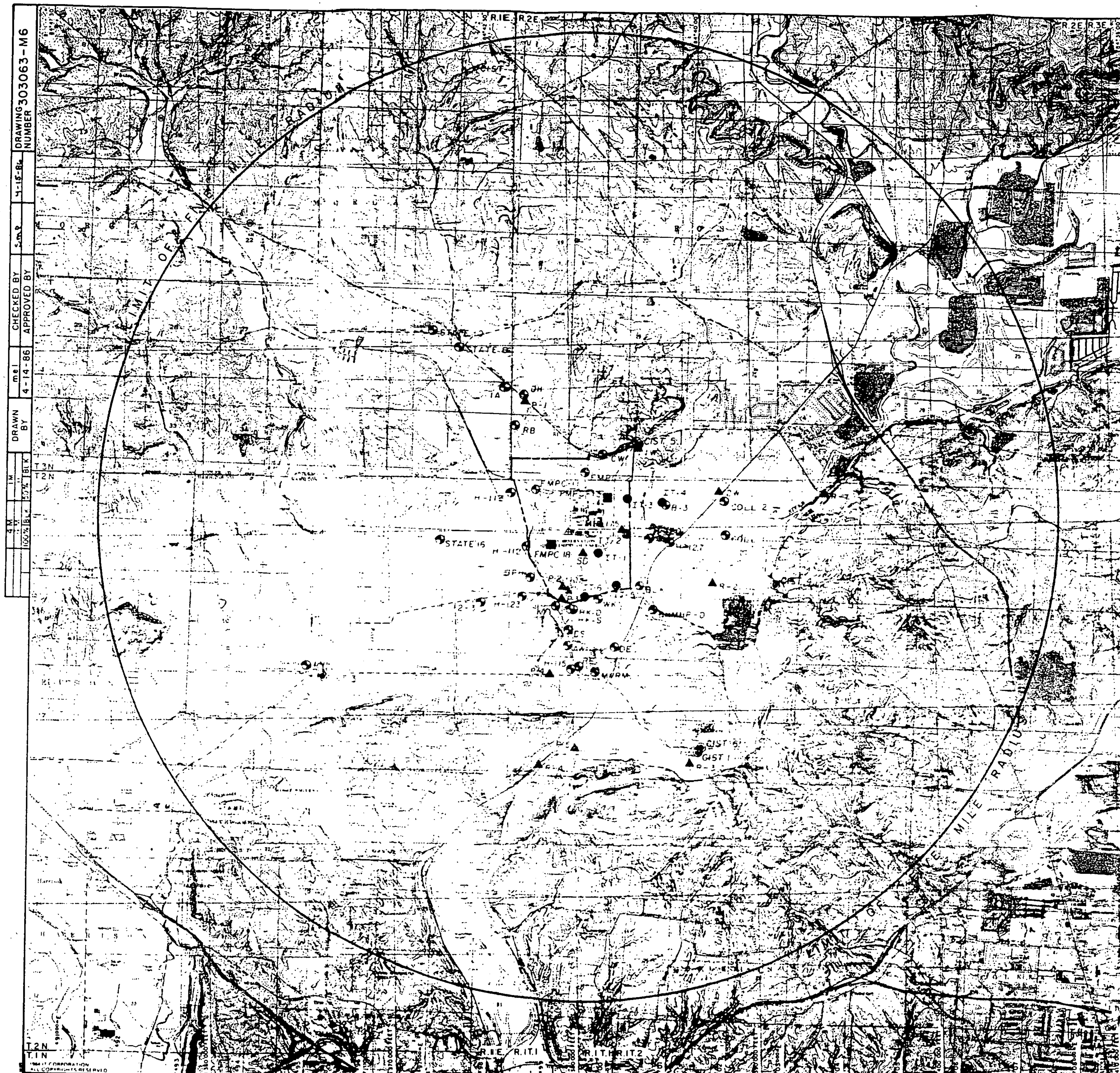

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NOTES:

WELL LOCATIONS ARE APPROXIMATE

CISTERN 2 NORTH OF FIVE MILE RADIUS.

LEGEND:

- ▲ SURFACE WATER AND SEDIMENT LOCATIONS
- ON-SITE PRODUCTION WELL SAMPLED
- WELLS SAMPLED (SINGLE WELL LOCATIONS)
- ■ WELL CLUSTERS SAMPLED
- ● IT WELLS SAMPLED
- ◉ CISTERN LOCATIONS

REVISIONS

GENERAL REVISION

REFERENCES

FIGURE 4-6

IT WATER AND SEDIMENT SAMPLING POINTS

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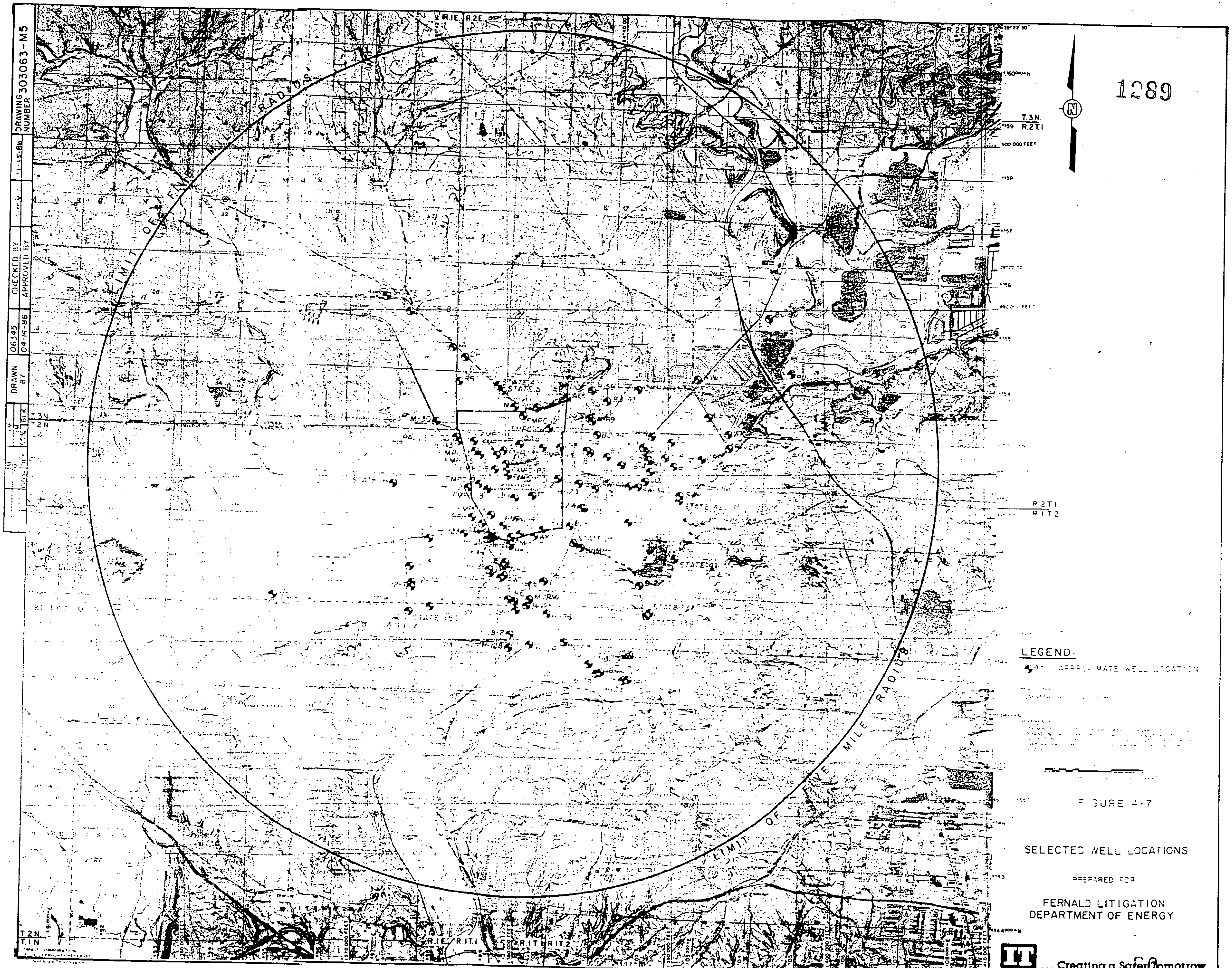

FIGURE 4-7

SELECTED WELL LOCATIONS

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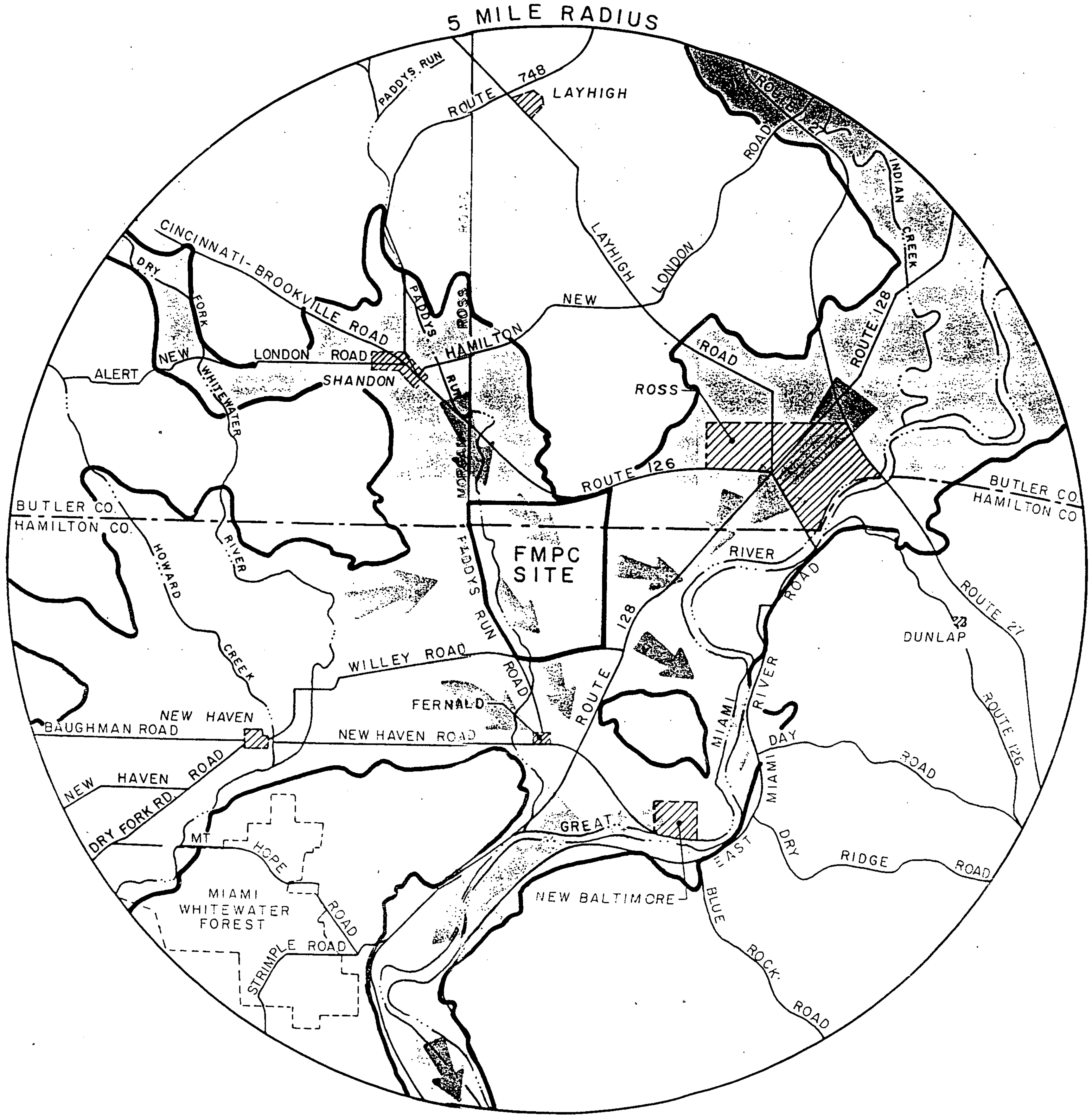

LEGEND:

BURIED CHANNEL AQUIFER

GENERALIZED GROUND WATER FLOW DIRECTION

S C A L E

0 6000 12000 FEET

FIGURE 4-8

GENERALIZED GROUND WATER FLOW IN BURIED CHANNEL AQUIFER

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	4-9-86	APPROVED BY			

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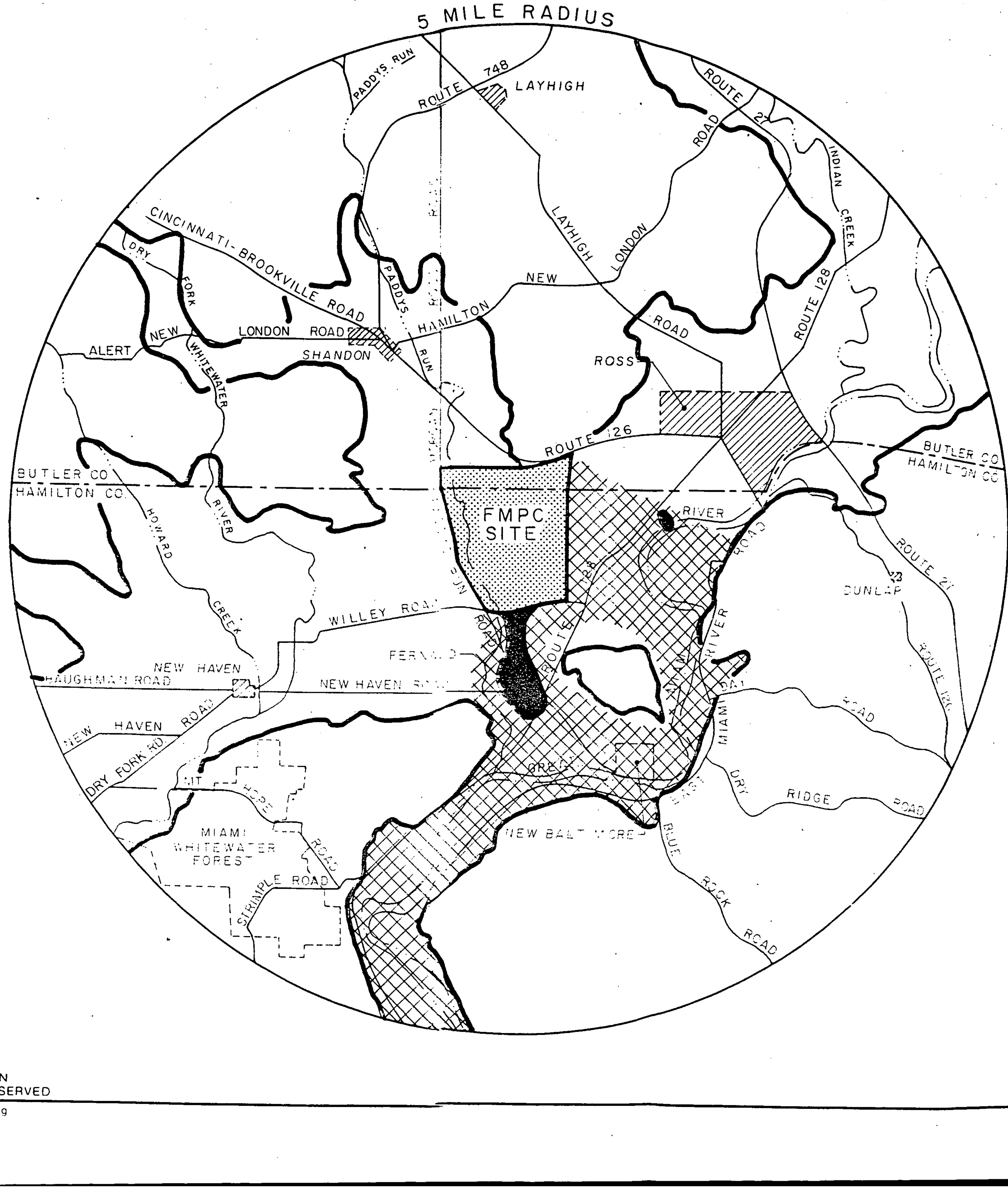

LEGEND:

- AFFECTED AREAS
- NON AFFECTED AREAS
- POTENTIALLY AFFECTED
- FMPC SITE
- LIMITS OF BURIED CHANNEL AQUIFER

NOTE:

AFFECTED AREAS/NON AFFECTED AREAS ARE BASED ON A URANIUM CONCENTRATION GREATER THAN 0.5 pCi/l IN GROUND WATER FLOWING BENEATH THE FMPC SITE, URANIUM CONCENTRATION GREATER THAN 1.4 pCi/l IN PADDYS RUN AND URANIUM CONCENTRATION GREATER THAN 6.8 pCi/l IN THE GREAT MIAMI RIVER

SCALE

0 6000 2000 FEET

FIGURE 4-9

MAXIMUM AREA POTENTIALLY AFFECTED BY SURFACE AND GROUND WATER FLOW FROM THE FMPC SITE

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5.0 HEALTH RISK ASSESSMENT

1289

5.1 INTRODUCTION

A health risk assessment has been performed for individuals in the vicinity of the FMPC. This section presents both the methodology and results of this assessment.

Since the FMPC began operations in the early 1950s, discharge monitoring has been performed. The greatest emphasis of the monitoring has been for airborne and waterborne uranium. Materials released into the environment may contribute an increase in exposure of individuals in the vicinity of the facility. An assessment of dose to such individuals relies on the quantification of such releases. Health risk estimates will depend on the past and present environmental inventory of hazardous materials.

This risk assessment has been performed to evaluate the impacts on the public health due to the releases from the FMPC.

Existing data were used in this health risk assessment, but only after careful review and in conjunction with recently acquired radiological and chemical analytical results and air particulate dispersion estimates.

5.2 URANIUM CONCENTRATIONS IN AIR, WATER, AND SOILS

5.2.1 Ambient Air

Measured airborne concentrations of uranium at the boundary of the FMPC have not exceeded an annual average of 2.5×10^{-14} µCi/ml (3.7×10^{-2} µg/m^3). Results of atmospheric dispersion modeling for the FMPC area indicate that the highest annual average concentration at the site boundary has been approximately 5.7×10^{-13} µCi/ml (0.83 µg/m^3). This ambient air level is predicated on the maximum observed annual release which occurred in 1955 (Chapter 2.0). This represents the highest off-site concentration of airborne particulates in the vicinity of the FMPC.

5.2.2 Ground Water

As described in Chapter 4.0, the average upgradient ground water concentration for total uranium is 5 x 10^{-10} μCi/ml (0.8 μg/ℓ). Of the five wells completed in the buried channel aquifer with total uranium concentrations above the upgradient level, the greatest concentration of total uranium was found to be approximately 183 pCi/ℓ or 1.83 x 10^{-7} μCi/ml (269 μg/ℓ).

5.2.3 Surface Water

As described in Chapter 4.0, the highest measured concentration of total uranium in off-site surface water was 4.2 x 10^{-9} μCi/ml (6.2 μg/ℓ).

5.2.4 Sediment

No off-site sediment concentrations determined by IT to date exceed 0.96 pCi/g (1.4 μg/g).

5.2.5 Soil

The highest measured soil concentration of total uranium analyzed by IT to date is 30.6 pCi/g (45.7 μg/g). This sample was collected at a point located within the 20 pCi/g area referred to in Chapter 3.0. The average background concentration in soil used in this health risk assessment is 1.2 pCi/g (1.8 μg/g) [U.S. National Council on Radiation Protection and Measurements (NCRP), 1974].

5.3 HAZARD IDENTIFICATION

5.3.1 Radioactivity

The most abundant radionuclides released from the FMPC since it began operations have been Uranium-238 and Uranium-234. From process inventory records and effluent records, it has been determined that all other radionuclides contribute a small fraction of any radiological hazard in the environment (Boback, et al., 1985).

The following description of radiation damage from exposure to uranium is taken from Publication No. 30 of the International Commission on Radiation Protection (ICRP, 1979).

Both Uranium-234 and Uranium-238 are long-lived alpha particle emitters and thereby present a hazard to body tissues after intake into the body. Following intake (inhalation or ingestion), a fraction of the radionuclides is taken up into the blood. For water-soluble inorganic compounds of uranium, this fraction is taken to be 0.05 (5 percent) for determining internal dose. For relatively insoluble compounds such as uranium tetrafluoride (UF_4), uranium dioxide (UO_2), and triuranium octoxide (U_3O_8), the fraction is taken to be 0.002 (0.2 percent). The unabsorbed fraction of the radionuclide is cleared from the lung by normal lung clearance mechanisms at varying clearance rates (for inhalation) or passes through the GI tract (for ingestion).

Absorbed uranium is then carried by the blood to body tissues. The following table lists the fraction of uranium in blood that is transferred to body tissues:

TISSUE		FRACTION FROM BLOOD TO TISSUE
mineral bone		0.223
kidneys		0.12052
other body tissue		0.12052
	TOTAL	0.46404 (46.4%)

The remainder (53.6 percent) is assumed to be directly excreted from the body.

Of the indicated fraction transferred from the blood to body tissues and retained for long periods of time, 0.023 is retained by the bone, 0.00052 is retained by the kidney, and 0.00052 is retained by other body tissues.

Therefore, in the case of ingested soluble uranium compounds, 0.1 percent (0.05 x 0.023 x 100 percent) is retained by bone for long periods of time. Similarly, 0.0026 percent of ingested soluble uranium compounds is retained for long periods of time by the kidney and 0.0026 percent to other body tissues.

Since isotopes of uranium are alpha particle emitters and a fraction of uranium taken into the body is deposited in the bone, energy deposited by alpha particles occurs in a very short distance in bone. Cells at carcinogenic risk in the skeleton are in the bone marrow and on bone surfaces.

In this assessment, the effective dose equivalent (dose) is calculated using the internationally accepted models of the ICRP which are endorsed by the NCRP. With this approach, the dose to individuals is calculated for each radionuclide and each mode of intake (ingestion and inhalation) (ICRP, 1979; NCRP, 1985).

Because of variations in duration of exposures, rates of intake, chemical form of radionuclides, and human metabolism, application of this method for chronic environmental exposure provides a best estimate of dose to individuals in specific areas.

5.3.2 Nonradioactive

The mode of chemical exposure and the nature of its duration will determine the character of the health impact and the probability of its occurrence. Modes of direct exposure are classified as inhalation, ingestion, and dermal (skin) contact. There may be indirect exposures by ingestion of contaminated food and dermal exposure to contaminants in water during bathing and recreational activities. Exposure durations are separated into two main classes: acute exposure is of short duration and low frequency; chronic exposure implies long-term, continuous, and highly frequent exposure.

5.3.2.1 Acute Exposure to Uranium Compounds

The chemical toxicity of a particular uranium compound is dependent on its water solubility. Generally, the uranium compounds discharged from the FMPC facility were in relatively insoluble forms, i.e., UO_2, U_3O_8, and UF_4. However, background records indicate that soluble uranium compounds could also be present in the form of uranium hexafluoride (UF_6), uranyl oxide (UO_3), and uranyl nitrate (UNH_4).

The relatively insoluble compounds are not considered to be toxic by the ingestion or direct contact (dermal absorption) exposure mode. Inhalation of these compounds at sufficiently high concentrations during exposures of short duration may have some health impact during an acute (minutes to hours) exposure. Oral toxicity of all uranium compounds is rather low. No mortality has been associated with any concentration of the insoluble uranium compounds.

Soluble uranium compounds were found to be toxic via inhalation, ingestion, and dermal modes of exposure. The primary target organ is the kidney.

5.3.2.2 Chronic Chemical Exposure to Uranium Compounds

Chronic exposure to the soluble compounds at sufficiently high levels can result in kidney damage. Lowest Observed Adverse Effects Levels (LOAELs) via inhalation was 0.20 milligram per cubic meter (mg/m^3) (Voegtlin and Hodge, 1951).

Chronic inhalation exposure to the insoluble compounds should not result in any health impacts where the ambient air concentration is below 2.5 mg/m^3 (Stockinger, 1981).

5.4 DOSE-RESPONSE RELATIONSHIPS

With regard to biological effects of radiation exposure, a linear, no threshold dose-response relationship was assumed. This assumption will, in general, lead to an overestimate of the effect of low doses [National Academy of Sciences (NAS), 1980].

In the context of toxicity due to chemical exposure, as differentiated from radiation, uranium produces health effects that possess a threshold below which the impact will not occur. Another way of stating this factor is that there will not be any health consequences (radiation is not included) from exposure to concentrations of uranium at low levels below the threshold value. Thresholds were determined from animal test data reported by Tannenbaum in the four-volume "Pharmacology and Toxicology of Uranium" (Voegtlin and Hodge, 1949 and 1951) and reviewed by Yuile (1973).

Table 5-1 is a tabulation of the chemical toxicity (dose-response) health parameters found in the literature. LOAELs and No Observed Adverse Response Levels (NOAELs) were derived from animal tests, as noted above.

5.5 EXPOSURE ASSESSMENT

5.5.1 Radiation

Exposure pathways are the routes hazardous materials take to reach a susceptible human receptor. Types of exposures from releases can be classified in the following manner:

- External (Sources Outside the Body)
  - Airborne radionuclides (submersion)
  - Surface (soil, sediment, vegetation, etc.)
- Internal (Sources Within the Body)
  - Airborne radionuclides in the lung (inhalation)
  - Food crops, milk, meat, and drinking water (ingestion).

An analysis of environmental dose pathways for isotopes of uranium released by the FMPC has been performed. Sixteen pathways were considered. These are:

1. Submersion Dose
2. Inhalation Dose
3. External Dose from Soil
4. External Dose from Irrigated Fields
5. External Dose from River Bank
6. Internal Dose from Water
7. External Dose from Water Immersion
8. External Dose from Water Surface
9. Internal Dose from Fish
10. Internal Dose from Fowl
11. Internal Dose from Food Crops
12. Internal Dose from Meat
13. Internal Dose from Milk
14. Internal Dose from Dairy Foods
15. Internal Dose from Eggs
16. Internal Dose from Direct Ingestion of Soils.

It has been determined that the pathways of concern for uranium are: inhalation, ingestion of water, ingestion of food, and direct ingestion of soil.

5.5.1.1 Inhalation

Dose equivalent rates for airborne concentration Uranium-238 and Uranium-234 are found in NCRP Report No. 45 (NCRP, 1975). The value of this factor is 0.2 mrem per year to the lung per 200 attoCuries per cubic meter (aCi/m^3) of inhaled air. This value assumes highest probable conditions for lung dose (small particles of insoluble materials). This factor becomes 0.048 mrem per year effective dose to the whole body per 2×10^{-16} μCi/ml when adjusted for quality factor and weighting factor.

Measured airborne concentrations at the site boundary have not exceeded 2.5×10^{-14} μCi/ml. This corresponds to a maximum inhalation dose of 6.0 mrem per year at the site boundary.

5.5.1.2 Drinking Water

Internal dose calculations for uranium in drinking water and food are summarized in NCRP Report No. 77 (NCRP, 1984). The effective dose factor presented in that report is 1.0×10^{-2} mrem per year per pCi per day dietary intake. The maximum daily intake of drinking water by an individual is assumed to be two liters per day (ICRP, 1972). The highest concentration of uranium in ground water measured in 1986 by IT was 183 pCi/l (Chapter 4.0). If two liters of this water were ingested each day for one year, the effective dose equivalent would be 3.7 mrem per year.

5.5.1.3 Food (Other Than Drinking Water)

It has recently been reported that the concentration of uranium in root and leafy vegetable crops is linearly proportional to the soil concentration of uranium (NCRP, 1984). Because there is no evidence of bioaccumulation of uranium in food chains, the linear proportionality of environmental concentration is applied to meat, eggs, milk, and dairy products. The calculated average background effective dose equivalent rate from food consumption by an individual for average background levels (1.2 pCi/g) of uranium is 0.009 mrem per year (NCRP, 1984). The highest measured off-site concentration of uranium in soil is 30.6 pCi/g. Assuming that all food crops consumed by an individual during a year were grown in a soil with such concentration, the dose from such consumption is 26 times the dose for food crops grown in the soil with a concentration of 1.2 pCi/g. For environmental levels of uranium 26 times average background levels, the annual effective dose equivalent rate is approximately 0.2 mrem per year.

5.5.1.4 Direct Ingestion of Soil 1289

It is possible that direct ingestion of soil can occur by eating unwashed vegetables or by other means. If the intake of soil is assumed to be one gram per day, using the highest measured concentration of uranium in soil (30.6 pCi/g), an annual effective dose equivalent of 0.2 mrem per year is obtained.

5.5.1.5 Summary of Annual Effective Dose Equivalent

Inhalation	- 6.0 mrem per year	- Assuming highest measured concentration at boundary of 2.5 x 10^{-14} µCi/ml
Drinking Water	- 3.7 mrem per year	- Assuming 2 liters per day for 365 days of 183 pCi/l
Food	- 0.2 mrem per year	- Assuming highest measured off-site soil concentration as 30.6 pCi/g
Ingestion of Soil	- 0.2 mrem per year	- Assuming ingestion of one gram per day of soil at 30.6 pCi/g
TOTAL	10 mrem per year.	

A special case is the inhalation dose for the year of highest release (1955) where the average annual air concentration at the site boundary is estimated by atmospheric dispersion modeling. This concentration of 5.7 x 10^{-13} µCi/ml will result in an annual effective dose equivalent of approximately 140 mrem per year. This represents the highest calculated inhalation dose to anyone who would have resided at the site boundary for one year. Estimated inhalation doses for all other years would be less than this. Calculated inhalation doses decrease with distance from the facility.

5.5.2 Chemical

5.5.2.1 Ambient Air Pathway

The greatest exposure to any individual in the vicinity of the FMPC would be for a person residing at that place on the site boundary where the highest average annual concentration occurred (Section 5.2.1). That concentration is 0.83 µg/m^3.

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5.5.2.2 Ingestion of Drinking Water

The highest measured concentration of uranium in ground water from the off-site wells sampled by IT is 183 pCi/l (269 μg/l). If it is assumed that this well is used for household purposes, the daily intake of uranium would be 538 μg.

5.5.2.3 Consumption of Food (Other Than Drinking Water)

Consumption of food, i.e., food crops, fish and shellfish, is not considered to be a viable exposure pathway due to the chemical toxicologic nature (threshold) of uranium and the miniscule (from a chemical exposure perspective) uptake in food crops and aquatic organisms.

5.5.2.4 Direct Ingestion of Soil

As set forth in Section 5.4.1.4, it is assumed that the daily intake of soils is 1 gram per day containing uranium at the highest measured level off site and the daily intake of uranium would be 45 μg.

5.5.2.5 Summary of Chemical Exposure Levels

Inhalation of uranium in airborne particulates	0.83	$\mu g/m^3$
Ingestion of uranium in drinking water	538	μg per day (268 μg/l)
Direct ingestion of uranium in soils	45	μg per day

5.6 RISK CHARACTERIZATION

In this assessment, the following two accepted principles have been employed:

- A carcinogenic risk due to radiation exposure is defined as the probability that a specified dose will cause fatal cancer in some fraction of the people exposed (NCRP, 1984)
- Dose response is considered to be independent of dose rate (NAS, 1980).

The absolute risk model as set forth by the Committee on the Biological Effects of Ionizing Radiation (NAS, 1980) was used by IT with modifications derived from reports of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR, 1977) and the ICRP (1977). Applying this model to the annual effective dose equivalent of 10 mrem, summarized in Section 5.5.1.5, results in 1×10^{-6} risk of incurring a fatal cancer at the maximum exposure level.

If the atmospheric dispersion modeling for the year of highest release is used, a total annual dose of 144 mrem (140 + 3.7 + 0.2 + 0.2) is calculated. Applying this model to the annual effective dose equivalent of 144 mrem results in 1.4×10^{-5} or a 14 to 1 million risk of incurring a fatal cancer.

5.6.1 Risk Characterization (Chemical)

Risk due to chemical exposure is characterized by comparing the maximum effective dose for the appropriate exposure mode and comparing the levels to health impact threshold parameters.

At the postulated maximum inhalation exposure concentration of 0.83 $\mu g/m^3$ of uranium in airborne particulates, and the assumption that all of the uranium is in the most toxic soluble form, this exposure level is about 0.004 (1 to 240) of the LOAEL of 0.2 mg/m^3. If characterization is based on a measured maximum annual average of 0.037 $\mu g/m^3$ over the years, this ratio would increase to about 1 to 54,000. All human receptors within the five-mile radius of the outside of the site would have a lower estimated risk.

If a 10-kilogram child drank one liter of water per day from the most contaminated source off site at 269 $\mu g/\ell$, the exposure level would still be 0.001 (1 to 740) of LOAEL observed in animal studies. This assumes that the uranium is in the form of the toxic soluble compound.

The most susceptible receptor, i.e., a 10-kilogram child ingesting one gram of soil daily containing 45 $\mu g/g$ of uranium, would be subjected to an exposure level that is 0.0002 (1 to 4,000) of the LOAEL. This assumes that the uranium is in a chemically toxic form and the soils contain uranium at the highest observed concentration.

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TABLE 5-1

HEALTH EFFECT PARAMETERS FOR ACUTE AND CHRONIC EXPOSURE TO URANIUM COMPOUNDS

SOLUBLE URANIUM COMPOUNDS (UF_6, UO_3, UO_2F_2, $UO_2(NO_3)_2$)		INSOLUBLE URANIUM COMPOUNDS (UO_2, U_3O_8, UF_4)	
EXPOSURE MODE	HEALTH EFFECTS PARAMETERS	EXPOSURE MODE	HEALTH EFFECTS PARAMETERS
ACUTE EXPOSURE DURATION (0-30 day Animal Study)			
Inhalation:	2.5 - 20 mg/m^3 - Fatal 0.2 mg/m^3 - Slightly toxic >0.2 mg/m^3 - NOAEL	Inhalation:	<20 mg/m^3 - Rarely fatal 2.5 mg/m^3 - LOAEL
Ingestion:	2-10% of diet - Fatal 0.1 to 1% - growth depression 0.02% - LOAEL (uranyl nitrate)	Ingestion:	No effect
Dermal:	May be fatal due to absorption	Dermal:	No effect
CHRONIC EXPOSURE DURATION (1-2 Year Animal Study)			
NOTE: Tolerance is increased over time with chronic low doses			
Inhalation:	0.25 mg/m^3 LOAEL 0.20 mg/m^3 LOAEL for (UF_6 + HF)	Inhalation:	0.5 mg/m^3 - NOAEL (UF_4) 300 mg/m^3 - LOAEL (UF_4)
Ingestion:	0.1% of diet - LOAEL (UNH_4) Equivalent to a dose of 200 mg/kg	Ingestion:	20% of diet - LOAEL (UF_4) No effect (UO_2)
Dermal:	Mild to moderate local skin irritation	Dermal:	No effect

References: Voegtlin and Hodge, 1951
Yuile, 1973

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ADDENDUM TO
INTERIM REPORT
AIR, SOIL, WATER, AND HEALTH RISK ASSESSMENT
IN THE VICINITY OF THE FMPC
FERNALD, OHIO

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SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
B0244	.	702.950	4353.510	2-15	30NOV84	2.0
B0246	.	703.420	4353.500	2-15	30NOV84	3.6
B0339	.	701.620	4353.970	2-15	30NOV84	2.1
B0341	.	702.170	4353.970	2-15	30NOV84	2.8
B0343	.	702.750	4353.970	2-15	30NOV84	3.5
B0345	.	703.250	4353.970	2-15	30NOV84	11.0
B0347	.	703.750	4353.970	2-15	30NOV84	2.3
B0408	.	698.100	4354.270	2-15	30NOV84	2.3
B0438	.	701.340	4354.430	2-15	30NOV84	7.1
B0440	.	701.930	4354.380	2-15	30NOV84	4.8
B0442	.	702.460	4354.520	2-15	30NOV84	3.9
B0444	.	702.920	4354.500	2-15	30NOV84	5.1
B0446	.	703.500	4354.490	2-15	30NOV84	4.2
B0448	.	704.000	4354.540	2-15	30NOV84	2.7
B0539	.	701.590	4354.920	2-15	30NOV84	3.4
B0640	.	701.860	4355.350	2-15	30NOV84	2.4
B1047	.	704.040	4357.450	2-15	30NOV84	3.4
B1152	.	705.280	4358.150	2-15	30NOV84	1.7
BS-1	.	699.400	4353.300	2-15	30DEC84	10.2
BS-2	.	700.120	4353.470	2-15	30DEC84	7.3
BS-3	.	700.070	4352.200	2-15	30DEC84	39.9
BS-4	.	699.950	4351.160	2-15	30DEC84	6.5
BS-5	.	698.760	4351.390	2-15	30DEC84	12.8
BS-6	.	698.510	4352.260	2-15	30DEC84	1.5
BS-7	.	698.180	4353.150	2-15	30DEC84	3.5
CROS-1	.	696.910	4349.670	2-15	30DEC84	4.8
CROS-2	.	696.850	4349.710	2-15	30DEC84	1.7
CROS-3	.	696.920	4349.800	2-15	30DEC84	1.0
CROS-4	.	696.950	4349.730	2-15	30DEC84	4.1
H0122	.	700.160	4350.390	2-15	30NOV84	5.3
H0220	.	699.850	4350.750	2-15	30NOV84	2.2
H0222	.	700.120	4350.750	2-15	30NOV84	3.1
H0226	.	700.390	4350.750	2-15	30NOV84	2.6
H0232	.	700.970	4350.690	2-15	30NOV84	3.7
H0311	.	698.770	4350.900	2-15	30NOV84	3.9
H0313	.	699.020	4350.920	2-15	30NOV84	8.2
H0315	.	699.300	4350.950	2-15	30NOV84	5.4
H0317	.	699.550	4350.920	2-15	30NOV84	4.4
H0324	.	700.310	4350.930	2-15	30NOV84	5.1
H0406	.	698.200	4351.110	2-15	30NOV84	2.9
H0410	.	698.650	4351.130	2-15	30NOV84	6.2
H0418	.	699.650	4351.180	2-15	30NOV84	3.0
H0420	.	699.860	4351.190	2-15	30NOV84	5.1
H0422	.	700.060	4351.190	2-15	30NOV84	4.0
H0426	.	700.440	4351.180	2-15	30NOV84	3.0

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(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
'R', 'R1', 'R2' - REPRESENT REPLICATED ANALYSES
(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
H0509	.	698.510	4351.240	2-15	30NOV84	4.7
H0528	.	700.570	4351.600	2-15	30NOV84	3.8
H0608	.	698.380	4351.530	2-15	30NOV84	6.9
H0622	.	700.050	4351.690	2-15	30NOV84	10.8
H0630	.	700.650	4351.700	2-15	30NOV84	2.6
H0636	.	701.300	4351.600	2-15	30NOV84	1.6
H0707	.	698.240	4351.720	2-15	30NOV84	3.8
H0722	.	700.060	4351.750	2-15	30NOV84	16.0
H0724	.	700.270	4351.760	2-15	30NOV84	4.4
H0731	.	700.690	4351.970	2-15	30NOV84	5.3
H0733	.	700.940	4351.790	2-15	30NOV84	4.2
H0735	.	701.150	4351.850	2-15	30NOV84	1.6
H0823	.	700.150	4351.860	2-15	30NOV84	4.5
H0908	.	698.390	4351.930	2-15	30NOV84	3.1
H0922	.	700.040	4351.950	2-15	30NOV84	20.9
H0924	.	700.190	4351.950	2-15	30NOV84	10.1
H0934	.	701.030	4351.950	2-15	30NOV84	1.2
H0938	.	701.580	4352.070	2-15	30NOV84	3.2
H1023	.	700.140	4352.080	2-15	30NOV84	8.7
H1105	.	697.940	4352.200	2-15	30NOV84	8.6
H1107	.	698.210	4352.210	2-15	30NOV84	4.1
H1122	.	700 040	4352.200	2-15	30NOV84	83.9
H1124	.	700.230	4352.200	2-15	30NOV84	10.4
H1135	.	701.180	4352.220	2-15	30NOV84	1.9
H1223	.	700.150	4352.340	2-15	30NOV84	49.4
H1225	.	700.310	4352.340	2-15	30NOV84	29.5
H1227	.	700.470	4352.350	2-15	30NOV84	12.5
H1306	.	698.130	4352.400	2-15	30NOV84	4.7
H1322	.	700.000	4352.440	2-15	30NOV84	13.2
H1326	.	700.390	4352.440	2-15	30NOV84	11.0
H1336	.	701.190	4352.440	2-15	30NOV84	2.7
H1423	.	700.130	4352.530	2-15	30NOV84	10.2
H1507	.	698.220	4352.620	2-15	30NOV84	8.6
H1522	.	699.990	4352.600	2-15	30NOV84	14.1
H1524	.	700.190	4352.600	2-15	30NOV84	10.9
H1623	.	700.120	4352.700	2-15	30NOV84	7.7
H1702	.	697.700	4352.780	2-15	30NOV84	2.3
H1706	.	698.100	4352.770	2-15	30NOV84	2.3
H1722	.	700.060	4352.830	2-15	30NOV84	38.1
H1724	.	700.220	4352.830	2-15	30NOV84	9.6
H1726	.	700.410	4352.830	2-15	30NOV84	10.2
H1823	.	700.110	4352.970	2-15	30NOV84	27.6
H1905	.	697.940	4353.040	2-15	30NOV84	2 3
H1907	.	698.220	4353.040	2-15	30NOV84	3.2
H1924	.	700.240	4353.040	2-15	30NOV84	6.3

(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
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(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON [illegible]

TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
H2004	.	697.820	4353.210	2-15	30NOV84	1.7
H2006	.	698.130	4353.210	2-15	30NOV84	3.6
H2008	.	698.350	4353.210	2-15	30NOV84	4.6
H2010	.	698.590	4353.210	2-15	30NOV84	7.9
H2012	.	698.840	4353.210	2-15	30NOV84	8.4
H2014	.	699.090	4353.210	2-15	30NOV84	9.7
H2016	.	699.320	4353.210	2-15	30NOV84	8.8
H2018	.	699.570	4353.210	2-15	30NOV84	14.7
H2022	.	700.040	4353.210	2-15	30NOV84	6.5
H2026	.	700.390	4353.210	2-15	30NOV84	8.1
H2032	.	700.870	4353.210	2-15	30NOV84	13.8
H2105	.	697.950	4353.430	2-15	30NOV84	3.0
H2115	.	699.220	4353.450	2-15	30NOV84	4.9
H2117	.	699.500	4353.450	2-15	30NOV84	8.9
H2119	.	699.720	4353.450	2-15	30NOV84	7.1
H2121	.	699.930	4353.450	2-15	30NOV84	7.2
H2124	.	700.220	4353.460	2-15	30NOV84	5.6
H2131	.	700.720	4353.490	2-15	30NOV84	13.1
H2206	.	698.060	4353.650	2-15	30NOV84	2.5
H2222	.	700.050	4353.730	2-15	30NOV84	5.8
H2230	.	700.580	4353.750	2-15	30NOV84	4.4
H2234	.	701.010	4353.770	2-15	30NOV84	6.0
H2238	.	701.350	4353.770	2-15	30NOV84	9.0
H2240	.	701.930	4353.780	2-15	30NOV84	3.5
H2242	.	702.490	4353.670	2-15	30NOV84	5.9
S-12-84	.	701.240	4351.810	2-15	17AUG84	1.8
S-15-84	.	695.710	4352.820	2-15	17AUG84	13.2
S-17-84	.	699.060	4348.430	2-15	17AUG84	2.1
S-24-84	.	705.600	4351.210	2-15	17AUG84	6.5
S-28-84	.	700.160	4352.080	2-15	17AUG84	13.8
S-5-84	.	702.530	4355.060	2-15	17AUG84	3.7
S-7-84	.	700.590	4356.230	2-15	17AUG84	3.1
S-8-84	.	702.840	4353.350	2-15	17AUG84	2.0
S-BS-1-84	.	699.400	4353.300	2-15	17AUG84	8.3
S-BS-2-84	.	700.120	4353.470	2-15	17AUG84	10.6
S-BS-3-84	.	700.070	4352.200	2-15	17AUG84	68.5
S-BS-4-84	.	699.950	4351.160	2-15	17AUG84	8.3
S-BS-5-84	.	698.760	4351.390	2-15	17AUG84	5.4
S-BS-6-84	.	698.510	4352.260	2-15	17AUG84	7.4
S-BS-7-84	.	698.180	4353.150	2-15	17AUG84	3.3
SS-08	.	700.610	4356.230	2-15	30DEC84	1 9
SS-09	.	702.530	4355.060	2-15	30DEC84	4.1
SS-10	.	702.980	4353.120	2-15	30DEC84	3.9
SS-11	.	700.200	4351.950	2-15	30DEC84	19.3
SS-12	.	701.230	4351.830	2-15	30DEC84	2 5

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TABLE 3.1
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SS-13	.	704.880	4352.060	2-15	30DEC84	1.1
SS-14	.	699.180	4348.610	2-15	30DEC84	2.3
SS-15	.	695.710	4352.820	2-15	30DEC84	2.2
FLSSS0002	7098	700.100	4352.300	0-2.5	06MAR86	73.9
FLSBS0003	7107	700.100	4352.300	2.5-5	06MAR86	71.0
FLSBS0004	7108	700.100	4352.300	5-7.5	06MAR86	32.8
FLSBS0005	7109	700.100	4352.300	7.5-10	06MAR86	7.6
FLSBS0006	7110	700.100	4352.300	10-12.5	06MAR86	3.4
FLSBS0007	7111 R1	700.100	4352.300	12.5-15	06MAR86	2.0
FLSBS0007	7111 R2	700.100	4352.300	12.5-15	06MAR86	4.0
FLS-SS0009	7099	700.100	4352.300	0-5	06MAR86	17.1
FLS-SS0013	7100	700.100	4352.300	0-5	06MAR86	32.8
FLS-SS0017	7101 R1	700.100	4352.300	0-5	06MAR86	59.9
FLS-SS0017	7101 R2	700.100	4352.300	0-5	06MAR86	63.6
FLS-SS0021	7102 A	700.100	4352.300	0-5	06MAR86	66.4
FLS-SS0021	7102 B	700.100	4352.300	0-5	06MAR86	60.1
FLS-SS0021	7102 R	700.100	4352.300	0-5	06MAR86	55.4
FLSSS0026	7103	700.100	4352.300	0-5	06MAR86	57.7
FLSSS0030	7104	700.100	4352.300	0-5	06MAR86	90.6
FLSSS0034	7105	700.100	4352.300	0-5	06MAR86	61.8
FLSSS0038	7106	700.100	4352.300	0-5	06MAR86	79.9
FLSBS0039	7112	700.100	4352.300	5-10	06MAR86	30.5
FLSBS0040	7113	700.100	4352.300	10-15	06MAR86	68.9
FLSSS0041	7170 A	697.300	4349.700	0-5	06MAR86	1.6
FLSSS0041	7170 B	697.300	4349.700	0-5	06MAR86	1.7
FLSSS0044	7171 R1	697.300	4349.700	0-5	06MAR86	1.2
FLSSS0044	7171 R2	697.300	4349.700	0-5	06MAR86	1.4
FLSSS0047	7172	697.300	4349.700	0-5	06MAR86	1.4
FLSSS0050	7173	697.300	4349.700	0-5	06MAR86	1.4
FLSSS0053	7174	697.300	4349.700	0-5	06MAR86	1.1
FLSBS0055	7195	697.300	4349.700	10-15	06MAR86	1.3
FLSSS0059	7176	697.300	4349.700	0-5	06MAR86	0.9
FLSSS0062	7177	697.300	4349.700	0-5	06MAR86	1.2
FLSSS0065	7178 R1	697.300	4349.700	0-2.5	06MAR86	1.1
FLSSS0065	7178 R2	697.300	4349.700	0-2.5	06MAR86	1.3
FLSBS0066	7202	697.300	4349.700	2.5-5	06MAR86	1.4
FLSBS0067	7203	697.300	4349.700	5-7.6	06MAR86	0.9
FLSBS0068	7204 A	697.300	4349.700	7.6-10	06MAR86	1.2
FLSBS0068	7204 B	697.300	4349.700	7.6-10	06MAR86	1.3
FLSBS0069	7205	697.300	4349.700	10-13	06MAR86	1.0
FLSBS0070	7206	697.300	4349.700	13-15	06MAR86	1.3
FLSSS0072	7245	700.200	4353.600	0-5	07MAR86	10.5
FLSSS0076	7451 A	702.000	4353.300	0-5	11MAR86	2.7
FLSSS0076	7451 B	702.000	4353.300	0-5	11MAR86	2.2
FLSSS0080	7452	697.100	4350.700	0-5	11MAR86	0.8

(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
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'R', 'R1', 'R2' - REPRESENT REPLICATED ANALYSES
(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT

TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
FLSSS0084	7453	697.900	4356.300	0-5	13MAR86	1.1
FLSSS0088	7454	697.700	4356.400	0-5	13MAR86	1.1
FLSSS0092	7455	698.700	4357.500	0-5	13MAR86	1.0
FLS-SS-0096	7456	698.700	4359.400	0-5	14MAR86	0.8
FLS-SS-0100	7457	697.800	4360.200	0-5	14MAR86	0.9
FLS-SS-0104	7458	697.800	4360.500	0-5	14MAR86	0.9
FLS-SS-0108	7459	697.900	4356.600	0-5	14MAR86	0.7
FLS-SS-0112	7460	699.600	4360.100	0-5	14MAR86	1.2
FLS-SS0116	7461	697.900	4358.600	0-5	14MAR86	0.7
FLS-SS-0120	7462	698.000	4360.400	0-5	15MAR86	1.2
FLS-SS-0124	7463 A	698.100	4360.600	0-5	15MAR86	0.9
FLS-SS-0124	7463 B*	698.100	4360.600	0-5	15MAR86	1.5
FLS-SS-0128	7464 R1	699.700	4357.200	0-5	15MAR86	0.8
FLS-SS-0128	7464 R2	699.700	4357.200	0-5	15MAR86	2.4
FLSSS0132	7449	698.000	4357.300	0-5	17MAR86	1.0
FLSSS0136	7450	698.100	4357.300	0-5	17MAR86	0.6
FLSSS0140	7447	697.900	4359.700	0-5	17MAR86	0.7
FLSSS0144	7448	699.500	4357.500	0-5	17MAR86	1.4
FLSSS0148	7445	699.000	4357.500	0-5	17MAR86	1.1
FLSSS0152	7446	699.300	4357.300	0-5	17MAR86	0.5
FLS-SS-0156	7579	697.100	4359.700	0-5	18MAR86	1.3
FLS-SS-0160	7580	696.700	4359.400	0-5	18MAR86	1.3
FLS-SS0164	7581	696.700	4359.700	0-5	18MAR86	1.5
FLS-SS0168	7582	699.500	4356.500	0-5	18MAR86	2.3
FLSSS0172	7583	698.000	4354.400	0-5	20MAR86	3.8
FLSSS0176	7584 A	698.000	4355.000	0-5	20MAR86	2.6
FLSSS0176	7584 B	698.000	4355.000	0-5	20MAR86	2.9
FLSSS0180	7585	697.900	4355.700	0-5	20MAR86	1.6
FLSSS0184	7586	697.900	4357.900	0-5	20MAR86	1.2
FLSSS0188	7587	698.100	4351.000	0-5	20MAR86	7.3
FLS-SS-0202	7768	696.300	4350.600	0-5	24MAR86	3.3
FLS-SS-0206	7769 R1	695.800	4350.400	0-5	24MAR86	1.2
FLS-SS-0206	7769 R2	695.800	4350.400	0-5	24MAR86	2.1
FLS-SS-0210	7770	695.600	4349.900	0-5	24MAR86	5.3
FLS-SS-0214	7771	694.900	4349.700	0-5	24MAR86	2.6
FLS-SS-0218	7772	694.400	4349.200	0-5	24MAR86	1.8
FLS-SS-0222	7773	693.900	4348.700	0-5	24MAR86	1.3
FLS-SS-0226	7774 A	693.200	4348.800	0-5	24MAR86	1.3
FLS-SS-0226	7774 B	693.200	4348.800	0-5	24MAR86	1.3
FLS-SS-0230	7775	692.600	4348.700	0-5	24MAR86	1.4
FLS-SS-0234	7777	692.000	4348.300	0-5	25MAR86	1.5
FLS-SS-0238	7778	691.700	4348.200	0-5	25MAR86	1.0
FLS-SS-0242	7776 R1	697.500	4350.900	0-5	25MAR86	3.8
FLS-SS-0242	7776 R2	697.500	4350.900	0-5	25MAR86	7.0
FLS-SS-0246	7779	695.700	4351.000	0-5	25MAR86	2.2

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(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

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TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
FLS-SS-0250	7780	695.700	4351.700	0-5	25MAR86	1.0
FLS-SS-0254	7783	695.700	4352.300	0-5	25MAR86	1.8
FLS-SS-0258	7781	695.700	4352.800	0-5	25MAR86	1.0
FLS-SS-0262	7782	695.600	4353.500	0-5	25MAR86	1.9
FLS-SS-0266	7784 A	695.600	4354.100	0-5	25MAR86	1.2
FLS-SS-0266	7784 B	695.600	4354.100	0-5	25MAR86	1.5
FLS-SS-0270	7785	695.600	4355.200	0-5	25MAR86	1.1
FLS-SS-0274	7898	695.600	4354.600	0-5	26MAR86	0.9
FLS-SS-0278	7897	696.200	4355.200	0-5	26MAR86	1.3
FLS-SS-0282	7900	696.900	4355.200	0-5	26MAR86	1.3
FLS-SS0286	7899	697.000	4356.000	0-5	26MAR86	0.9
FLS-SS-0290	7902 A	696.300	4355.700	0-5	26MAR86	0.9
FLS-SS-0290	7902 B	696.300	4355.700	0-5	26MAR86	0.6
FLS-SS-0294	7901	697.500	4355.200	0-5	26MAR86	1.0
FLS-SS-0298	7904	698.600	4355.600	0-5	26MAR86	2.2
FLS-SS0302	7903	699.000	4356.000	0-5	26MAR86	3.5
FLS-SS-0306	8199	699.600	4358.500	0-5	27MAR86	0.9
FLS-SS-0310	8200	700.000	4357.800	0-5	27MAR86	1.7
FLS-SS-0314	8201 A	700.200	4358.400	0-5	27MAR86	1.0
FLS-SS-0314	8201 B	700.200	4358.400	0-5	27MAR86	0.9
FLSSS0318	8202	696.900	4356.900	0-5	31MAR86	0.9
FLSSS0322	8203	696.700	4357.700	0-5	01MAR86	0.9
FLSSS0326	8204	696.800	4358.300	0-5	31MAR86	1.1
FLSSS0330	8205	697.200	4358.800	0-5	31MAR86	1.1
FLSSS0334	8206	697.900	4359.100	0-5	31MAR86	1.1
FLSSS0338	8207	699.800	4360.600	0-5	31MAR86	1.5
FLSSS0342	8208	698.700	4353.900	0-5	31MAR86	2.6
FLSSS0346	8209	698.300	4359.300	0-5	31MAR86	0.6
FLS-SS0350	8210	698.400	4359.400	0-5	01APR86	1.0
FLS-SS0354	8211	699.200	4357.000	0-5	01APR86	2.4
FLS-SS-0358	8212 R1	698.800	4356.800	0-5	01APR86	2.1
FLS-SS-0358	8212 R2	698.800	4356.800	0-5	01APR86	2.6
FLS-SS-0362	8213	698.300	4356.600	0-5	01APR86	0.9
FLS-SS-0366	8214	702.000	4355.400	0-5	02APR86	1.4
FLS-SS-0370	8215	701.400	4355.600	0-5	02APR86	4.4
FLS-SS-0374	8216	700.800	4356.000	0-5	02APR86	1.1
FLS-SS0378	8217	700.300	4356.600	0-5	02APR86	2.4
FLS-SS-0382	8218	700.100	4356.200	0-5	02APR86	1.9
FLS-SS-0386	8219	700.800	4356.400	0-5	02APR86	1.9
FLS-SS-0390	8220	701.100	4356.900	0-5	02APR86	1.4
FLS-SS-0394	8221	701.800	4356.100	0-5	03APR86	2.2
FLS-SS-0398	8222 A	701.800	4356.800	0-5	03APR86	3.0
FLS-SS-0398	8222 B	701.800	4356.800	0-5	03APR86	2.7
FLS-SS-0402	8223	702.000	4357.200	0-5	03APR86	1.2
FLS-SS0406	8224	702.800	4357.100	0-5	03APR86	0.8

(1) 'A','B' - REPRESENT DUPLICATE ANALYSES
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'R','R1','R2' - REPRESENT REPLICATED ANALYSES
(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT

TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
FLSSS0410	8225	703.100	4356.900	0-5	03APR86	1.1
FLSSS0414	8226	703.200	4357.500	0-5	03APR86	1.6
FLSSS0418	8227	703.100	4356.200	0-5	03APR86	1.1
FLS-SS0422	8228	695.600	4356.000	0-5	04APR86	1.7
FLS-SS0426	8229	695.000	4356.200	0-5	04APR86	0.8
FLS-SS-0430	8230	694.500	4356.600	0-5	04APR86	1.3
FLS-SS-0434	8231 A	694.000	4356.800	0-5	04APR86	0.7
FLS-SS-0434	8231 B	694.000	4356.800	0-5	04APR86	0.8
FLS-SS-0438	8232	693.300	4357.000	0-5	04APR86	0.8
FLS-SS-0442	8233	692.300	4357.900	0-5	04APR86	0.9
FLS-SS0446	8234	692.700	4357.400	0-5	04APR86	0.8
FLS-SS-0450	8532 A	694.300	4348.300	0-5	07APR86	0.9
FLS-SS-0450	8532 B	694.300	4348.300	0-5	07APR86	1.1
FLS-SS-0454	8533	694.700	4348.000	0-5	07APR86	0.8
FLS-SS-0458	8534	695.600	4347.500	0-5	07APR86	1.3
FLS-SS-0462	8535	696.200	4347.200	0-5	07APR86	1.0
FLS-SS-0466	8536	696.200	4348.300	0-5	08APR86	1.0
FLS-SS0470	8537	696.000	4347.800	0-5	08APR86	0.9
FLS-SS0474	8538 A	696.600	4346.500	0-5	08APR86	1.0
FLS-SS0474	8538 B*	696.600	4346.500	0-5	08APR86	1.4
FLS-SS0478	8539	694.100	4353.000	0-5	08APR86	0.7
FLS-SS0482	8540	694.000	4353.500	0-5	08APR86	0.9
FLS-SS0486	8541	694.100	4354.300	0-5	08APR86	1.0
FLS-SS-0490	8542	694.000	4354.800	0-5	08APR86	0.9
FLS-SS-0494	8543	694.500	4355.100	0-5	08APR86	0.6
FLS-SS-0498	8544	694.900	4355.800	0-5	08APR86	0.9
FLSSS0501	7167	698.500	4351.300	0-5	07MAR86	5.7
FLSSS0504	7168	700.000	4350.100	0-5	07MAR86	1.5
FLSSS0508	7169	699.200	4350.200	0-5	07MAR86	3.6
FLSSS0512	7255	700.200	4351.900	0-5	10MAR86	30.6
FLSSS0515	7256 A	700.700	4351.800	0-5	10MAR86	2.7
FLSSS0515	7256 B	700.700	4351.800	0-5	10MAR86	3.4
FLSSS0519	7257	700.400	4351.200	0-5	10MAR86	3.6
FLSSS0522	7252	700.200	4351.300	0-5	10MAR86	3.9
FLSSS0526	7253	701.200	4351.800	0-5	10MAR86	1.8
FLSSS0530	7254	701.400	4351.300	0-5	10MAR86	1.5
FLS-SS-0533	7249	700.900	4351.500	0-5	11MAR86	1.8
FLS-SS-0537	7250	699.000	4350.800	0-5	11MAR86	4.2
FLS-SS-0540	7251	699.700	4351.000	0-5	11MAR86	3.7
FLS-SS-0543	7247	699.800	4350.600	0-5	11MAR86	3.3
FLS-SS-0547	7248	697.300	4350.300	0-5	11MAR86	3.9
FLS-SS-0551	7246 A	697.900	4349.600	0-5	11MAR86	1.8
FLS-SS-0551	7246 B	697.900	4349.600	0-5	11MAR86	0 6
FLS-SS-0551	7246 R	697.900	4349.600	0-5	11MAR86	2 0
FLSSS0554	7348	698.600	4349.700	0-5	12MAR86	0 8

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(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

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TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
FLSSS0558	7349	699.400	4353.400	0-5	14MAR86	7.2
FLSSS0562	7350	699.600	4353.900	0-5	14MAR86	8.3
FLSSS0566	7346	700.000	4353.500	0-5	14MAR86	11.2
FLSSS0570	7347	699.900	4354.100	0-5	14MAR86	3.1
FLSSS0574	7353	701.700	4354.400	0-5	14MAR86	1.7
FLSSS0577	7354 A	704.500	4356.100	0-5	14MAR86	3.5
FLSSS0577	7354 B	704.500	4356.100	0-5	14MAR86	3.4
FLSSS0580	7355	704.500	4356.400	0-5	14MAR86	1.0
FLSSS0583	7356	704.400	4356.500	0-5	14MAR86	0.9
FLSSS0587	7351	704.100	4356.100	0-5	14MAR86	1 8
FLSSS0591	7352	705.400	4353.000	0-5	14MAR86	1.4
FLSSS0595	7362	705.300	4354.100	0-5	14MAR86	1.4
FLSSS0599	7363	697.200	4346.900	0-5	15MAR86	2.1
FLSSS0603	7364	698.000	4347.500	0-5	15MAR86	0.7
FLSSS0607	7359	704.300	4357.100	0-5	15MAR86	1.3
FLSSS0610	7360	704.200	4356.800	0-5	15MAR86	2.9
FLSSS0613	7361	704.700	4356.800	0-5	15MAR86	1.3
FLSSS0617	7357	704.100	4357.500	0-5	15MAR86	1.6
FLSSS0620	7358	705.900	4352.600	0-5	15MAR86	1.2
FLSSS0624	7434	705.400	4353.500	0-5	17MAR86	2.1
FLSSS0628	7435	705.900	4353.300	0-5	17MAR86	1.3
FLSSS0631	7436	705.700	4354.100	0-5	17MAR86	1.1
FLSSS0634	7437	706.000	4354.300	0-5	17MAR86	1.6
FLSSS0638	7438	706.700	4354.700	0-5	17MAR86	1.6
FLSSS0641	7439 A	706.000	4353.800	0-5	17MAR86	1.5
FLSSS0641	7439 B	706.000	4353.800	0-5	17MAR86	0.6
FLSSS0641	7439 R	706.000	4353.800	0-5	17MAR86	1.7
FLSSS0645	7440	706.000	4352.000	0-5	17MAR86	1.1
FLSSS0648	7441	706.500	4353.700	0-5	17MAR86	1.3
FLSSS0652	7442	707.000	4352.900	0-5	17MAR86	0.9
FLSSS0664	7559	703.800	4354.800	0-5	19MAR86	1.1
FLSSS0672	7560	705.100	4357.400	0-5	19MAR86	1.2
FLSSS0675	7561	705.200	4358.100	0-5	19MAR86	0.9
FLSSS0679	7562	703.600	4358.100	0-5	19MAR86	1.0
FLSSS0683	7563	703.200	4358.700	0-5	19MAR86	0.7
FLSSS0687	7564 A	704.700	4353.900	0-5	19MAR86	1.4
FLSSS0687	7564 B	704.700	4353.900	0-5	19MAR86	1.0
FLSSS0691	7565	704.000	4354.100	0-5	19MAR86	1.3
FLSSS0695	7566	704.500	4358.800	0-5	19MAR86	0.8
FLSSS0699	7567	703.500	4355.800	0-5	19MAR86	1.9
FLSSS0703	7568	703.500	4356.500	0-5	19MAR86	1.4
FLSSS0706	7569	701.800	4358.100	0-5	19MAR86	1.1
FLSSS0710	7570	702.100	4357.700	0-5	19MAR86	3.2
FLSSS0714	7571	701.500	4357.500	0-5	20MAR86	1.5
FLSSS0717	7572	702.300	4358.500	0-5	20MAR86	1.9

(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
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(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT

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TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
FLSSS0720	7573	702.700	4359.100	0-5	20MAR86	1.5
FLSSS0723	7574	703.100	4359.500	0-5	20MAR86	1.0
FLSSS0726	7575 R1	702.200	4359.500	0-5	20MAR86	1.2
FLSSS0726	7575 R2	702.200	4359.500	0-5	20MAR86	1.0
FLSSS0730	7576	701.900	4359.900	0-5	20MAR86	1.3
FLSSS0733	7577	701.500	4359.600	0-5	20MAR86	1.7
FLSSS0736	7578	700.900	4359.300	0-5	20MAR86	1.7
FLSSS0740	7786	703.400	4354.900	0-5	24MAR86	1.5
FLSSS0744	7787	702.900	4354.300	0-5	24MAR86	2.7
FLSSS0748	7788	702.300	4353.500	0-5	24MAR86	1.6
FLSSS0752	7789	701.600	4352.700	0-5	24MAR86	1.7
FLSSS0756	7790 R1	701.200	4352.300	0-5	24MAR86	3.9
FLSSS0756	7790 R2	701.200	4352.300	0-5	24MAR86	3.5
FLSSS0760	7791	701.800	4353.800	0-5	24MAR86	2.6
FLSSS0763	7792	701.200	4353.800	0-5	24MAR86	2.6
FLSSS0766	7793	700.800	4353.700	0-5	24MAR86	1.9
FLSSS0774	7907	702.400	4355.100	0-5	25MAR86	0.7
FLSSS0778	7908	702.500	4354.100	0-5	25MAR86	1.5
FLSSS0782	7909	702.900	4353.400	0-5	25MAR86	2.1
FLSSS0786	7910	703.600	4354.000	0-5	25MAR86	1.7
FLSSS0789	7911	703.400	4355.500	0-5	25MAR86	1.7
FLSSS0792	7912	704.400	4353.600	0-5	25MAR86	1.4
FLSSS0795	7913	704.800	4353.200	0-5	25MAR86	1.1
FLSSS0798	7914	705.100	4352.700	0-5	25MAR86	1.0
FLSSS0801	7915 A	705.600	4352.100	0-5	25MAR86	0.7
FLSSS0801	7915 B	705.600	4352.100	0-5	25MAR86	0.9
FLSSS0804	7916	706.400	4351.400	0-5	25MAR86	1.2
FLSSS0808	7917	706.600	4350.800	0-5	25MAR86	1.2
FLSSS0812	7918	706.600	4350.000	0-5	25MAR86	1.2
FLSSS0816	7919	706.800	4349.300	0-5	25MAR86	1.2
FLSSS0820	7920	706.500	4348.700	0-5	25MAR86	0.8
FLSSS0824	7921	706.400	4349.500	0-5	25MAR86	0.5
FLSSS0827	7922	706.000	4350.200	0-5	25MAR86	0.8
FLSSS0831	7923	705.700	4350.900	0-5	25MAR86	0.6
FLSSS0834	7924	705.400	4351.800	0-5	25MAR86	0.9
FLSSS0837	7925 A	704.700	4352.400	0-5	26MAR86	2.2
FLSSS0837	7925 B	704.700	4352.400	0-5	26MAR86	1.1
FLSSS0837	7925 R	704.700	4352.400	0-5	26MAR86	3.3
FLSSS0840	7926	704.000	4353.000	0-5	26MAR86	1.8
FLSSS0844	7927	703.400	4352.900	0-5	26MAR86	2.7
FLSSS0847	7928	702.800	4352.500	0-5	26MAR86	2.5
FLSSS0850	7929	702.700	4351.900	0-5	26MAR86	2.5
FLSSS0854	7930	702.500	4351.300	0-5	26MAR86	0.9
FLSSS0857	7931	702.300	4350.800	0-5	26MAR86	0.7
FLSSS0861	7932	702.400	4350.000	0-5	26MAR86	2.2

(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
'R', 'R1', 'R2' - REPRESENT REPLICATED ANALYSES
(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT

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TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
FLSSS0865	7933	702.600	4349.400	0-5	26MAR86	1.1
FLSSS0869	7934	702.500	4348.700	0-5	26MAR86	0.7
FLSSS0872	7935 A	702.100	4348.200	0-5	26MAR86	1.1
FLSSS0872	7935 B	702.100	4348.200	0-5	26MAR86	1.0
FLSSS0875	7936	701.300	4348.000	0-5	26MAR86	0.9
FLSSS0879	7937	700.700	4348.200	0-5	26MAR86	1.0
FLSSS0882	7938	700.000	4348.300	0-5	26MAR86	0.9
FLSSS0886	7939	699.400	4348.100	0-5	26MAR86	1.0
FLSSS0889	7940	698.900	4347.600	0-5	26MAR86	1.4
FLSSS0893	7941	698.700	4346.900	0-5	26MAR86	0.6
FLSSS0896	7942	698.200	4346.500	0-5	26MAR86	1.0
FLSSS0899	7943	698.000	4345.800	0-5	27MAR86	1.6
FLSSS0903	7944	698.400	4345.000	0-5	27MAR86	0.8
FLSSS0906	7945 A	698.700	4344.400	0-5	27MAR86	0.8
FLSSS0906	7945 B	698.700	4344.400	0-5	27MAR86	0.8
FLSSS0910	7946	698.900	4343.700	0-5	27MAR86	0.8
FLSSS0914	7947	698.800	4345.700	0-5	27MAR86	0.9
FLSSS0918	7948	699.200	4346.200	0-5	27MAR86	1.2
FLSSS0922	7949	699.800	4346.300	0-5	27MAR86	0.8
FLSSS0926	7950	700.500	4346.300	0-5	27MAR86	1.2
FLSSS0930	7951	700.500	4345.700	0-5	27MAR86	1.1
FLSSS0934	8235 A	697.600	4347.800	0-5	31MAR86	0.8
FLSSS0934	8235 B*	697.600	4347.800	0-5	31MAR86	1.1
FLSSS0938	8236	697.500	4348.400	0-5	31MAR86	1.1
FLSSS0942	8237	697.300	4349.000	0-5	31MAR86	1.2
FLSSS0946	8238	698.300	4347.800	0-5	31MAR86	0.7
FLSSS0949	8239	698.700	4348.300	0-5	31MAR86	1.0
FLSSS0952	8240	699.300	4348.700	0-5	31MAR86	3.5
FLSSS0956	8241	701.200	4348.500	0-5	31MAR86	1.0
FLSSS0960	8242	700.600	4348.700	0-5	31MAR86	1.4
FLSSS0963	8243	701.800	4348.600	0-5	31MAR86	0.7
FLSSS0966	8244	701.900	4349.200	0-5	31MAR86	1.0
FLSSS0969	8245	702.900	4349.900	0-5	31MAR86	1.1
FLSSS0973	8246 A	703.600	4349.800	0-5	01APR86	1.4
FLSSS0973	8246 B*	703.600	4349.800	0-5	01APR86	1.5
FLSSS0977	8247	704.300	4349.600	0-5	01APR86	1.0
FLSSS0980	8248	705.000	4349.300	0-5	01APR86	0.5
FLSSS0984	8249	705.600	4349.100	0-5	01APR86	0.7
FLSSS0987	8250	706.200	4348.900	0-5	01APR86	0.7
FLSSS0991	8251	704.700	4351.700	0-5	01APR86	1.5
FLSSS0995	8252	704.000	4351.500	0-5	01APR86	1.6
FLSSS0998	8253 A	703.500	4351.300	0-5	01APR86	2.0
FLSSS0998	8253 B*	703.500	4351.300	0-5	01APR86	2.1
FLSSS2002	8254 A	703.000	4351.200	0-5	01APR86	1.2
FLSSS2002	8254 B*	703.000	4351.200	0-5	01APR86	1.0

(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
'R', 'R1', 'R2' - REPRESENT REPLICATED ANALYSES
(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT

TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
FLSSS2002	8254 R	703.000	4351.200	0-5	01APR86	1.7
FLSSS2006	8255 A	703.600	4350.700	0-5	01APR86	1.3
FLSSS2006	8255 B	703.600	4350.700	0-5	01APR86	1.0
FLSSS2010	8256	704.100	4350.200	0-5	01APR86	0.9
FLSSS2014	8257	702.900	4348.300	0-5	02APR86	0.9
FLSSS2017	8258	702.400	4347.600	0-5	02APR86	0.8
FLSSS2021	8259	703.000	4347.500	0-5	02APR86	1.3
FLSSS2024	8260 A	702.700	4347.000	0-5	02APR86	1.1
FLSSS2024	8260 B*	702.700	4347.000	0-5	02APR86	1.8
FLSSS2024	8260 R	702.700	4347.000	0-5	02APR86	1.0
FLSSS2028	8261	703.600	4347.900	0-5	02APR86	0.8
FLSSS2036	8263	703.400	4348.900	0-5	02APR86	1.0
FLSSS2040	8264 A	704.700	4348.000	0-5	02APR86	0.8
FLSSS2040	8264 B	704.700	4348.000	0-5	02APR86	1.0
FLSSS2043	8265	704.100	4347.500	0-5	02APR86	0.7
FLSSS2046	8266	704.000	4348.800	0-5	02APR86	1.2
FLSSS2050	8545	701.200	4349.000	0-5	03APR86	0.7
FLSSS2054	8546	701.700	4347.800	0-5	03APR86	1.1
FLSSS2058	8547	701.400	4347.200	0-5	03APR86	1.0
FLSSS2062	8548	700.900	4346.700	0-5	03APR86	0.9
FLSSS2069	8550	703.200	4346.800	0-5	03APR86	0.6
FLSSS2072	8551	703.600	4347.200	0-5	03APR86	0.7
FLSSS2080	8553	704.600	4346.300	0-5	03APR86	0.8
FLSSS2087	8555	705.100	4346.500	0-5	03APR86	1.0
FLSSS2091	8556	704.700	4351.100	0-5	04APR86	1.0
FLSSS2094	8557	705.300	4351.200	0-5	04APR86	1.2
FLSSS2098	8558 A	705.400	4348.200	0-5	04APR86	0.9
FLSSS2098	8558 B	705.400	4348.200	0-5	04APR86	0.8
FLSSS2105	8560	706.400	4347.900	0-5	04APR86	1.2
FLSSS2109	8561	702.600	4346.500	0-5	04APR86	1.1
FLSSS2112	8562	702.900	4346.000	0-5	04APR86	1.0
FLSSS2116	8563 A	703.500	4345.600	0-5	04APR86	1.5
FLSSS2116	8563 B	703.500	4345.600	0-5	04APR86	0.8
FLSSS2120	8564	701.600	4346.500	0-5	04APR86	1.3
FLSSS2123	8565	701.200	4345.900	0-5	04APR86	1.1
FLS-SS2128	8566	694.800	4357.100	0-5	09APR86	1.1
FLS-SS2132	8567	694.800	4357.800	0-5	09APR86	0.8
FLS-SS2136	8568	694.700	4358.400	0-5	09APR86	0.9
FLS-SS2140	8569	694.700	4359.000	0-5	09APR86	0.9
FLS-SS2144	8570	694.000	4352.400	0-5	10APR86	0.9
FLS-SS2148	8571	693.500	4351.900	0-5	10APR86	0.8
FLS-SS2152	8572	692.900	4351.600	0-5	10APR86	0.9
FLS-SS2156	8573	692.900	4351.100	0-5	10APR86	1.2
FLS-SS2160	8574	692.900	4350.500	0-5	10APR86	1.3
FLS-SS2164	8575	692.900	4349.900	0-5	10APR86	1.6

(1) 'A','B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
'R','R1','R2' - REPRESENT REPLICATED ANALYSES
(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

TABLE 3.1
SOIL SAMPLE TOTAL URANIUM CONCENTRATIONS NEAR THE FMPC SITE

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER(1)	UTM(2) E-W (KM)	UTM(2) N-S (KM)	DEPTH RANGE CM	SAMPLE COLLECTION DATE	TOTAL URANIUM(3) P CI PER GRAM
FLS-SS-2168	8576	692.900	4349.200	0-5	10APR86	1.1
FLS-SS2172	8577	696.900	4351.400	0-5	11APR86	2.4
FLS-SS-2176	8578	696.900	4352.200	0-5	11APR86	0.6
FLS-SS-2180	8579 A	696.300	4352.200	0-5	11APR86	2 5
FLS-SS-2180	8579 B	696.300	4352.200	0-5	11APR86	2.8
FLS-SS-2184	8580	696.400	4346.900	0-5	11APR86	1.1
FLSSS2215	8922	698.500	4352.800	0-5	23APR86	15.7
FLSSS2219	8923	698.700	4352.200	0-5	23APR86	6.3
FLSSS2223	8924	699.200	4351.200	0-5	23APR86	20.7
FLSSS2227	8925	699.700	4351.500	0-5	23APR86	25.1
FLSSS2231	8926 A	699.100	4353.000	0-5	24APR86	36.5
FLSSS2231	8926 B	699.100	4353.000	0-5	24APR86	34.6
FLSSS2235	8927	698.300	4352.300	0-5	24APR86	8.5

(1) 'A','B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
'R','R1','R2' - REPRESENT REPLICATED ANALYSES
(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT

TABLE 3.2
PAIRED 1986 AND 1984 SOIL SAMPLES

OBS	1986 FIELD SAMPLE NUMBER(1)	1986 UTM(2) E-W (KM)	1986 UTM(2) N-S (KM)	1984 FIELD SAMPLE NUMBER	1984 UTM(2) E-W (KM)	1984 UTM(2) N-S (KM)	DISTANCE BETWEEN SAMPLES (M)	1986 TOTAL URANIUM(3) P CI PER GM	1984 TOTAL URANIUM(3) P CI PER GM
1	FLSSS0782	702.900	4353.400	B0244	702.950	4353.510	121	2.1	2.0
2	FLS-SS-0366	702.000	4355.400	B0640	701.860	4355.350	149	1.4	2.4
3	FLSSS0617	704.100	4357.500	B1047	704.040	4357.450	78	1.6	3.4
4	FLSSS0675	705.200	4358.100	B1152	705.280	4358.150	94	0.9	1.7
5	FLSSS0558	699.400	4353.400	BS-1	699.400	4353.300	100	7.2	10.2
6	FLSSS0566	700.000	4353.500	BS-2	700.120	4353.470	124	11.2	7.3
7	FLSSS0002 **	700.100	4352.300	BS-3	700.070	4352.200	104	72.5	39.9
8	FLS-SS0009	700.100	4352.300	BS-3	700.070	4352.200	104	17.1	39.9
9	FLS-SS0013	700.100	4352.300	BS-3	700.070	4352.200	104	32.8	39.9
10	FLS-SS0017 *	700.100	4352.300	BS-3	700.070	4352.200	104	61.8	39.9
11	FLS-SS0021 *	700.100	4352.300	BS-3	700.070	4352.200	104	60.6	39.9
12	FLSSS0026	700.100	4352.300	BS-3	700.070	4352.200	104	57.7	39.9
13	FLSSS0030	700.100	4352.300	BS-3	700.070	4352.200	104	90.6	39.9
14	FLSSS0034	700.100	4352.300	BS-3	700.070	4352.200	104	61.8	39.9
15	FLSSS0038	700.100	4352.300	BS-3	700.070	4352.200	104	79.9	39.9
16	FLS-SS-0537	699.000	4350.800	H0313	699.020	4350.920	122	4.2	8.2
17	FLSSS0188	698.100	4351.000	H0406	698.200	4351.110	149	7.3	2.9
18	FLSSS0519	700.400	4351.200	H0426	700.440	4351.180	45	3.6	3.0
19	FLSSS0501	698.500	4351.300	H0509	698.510	4351.240	61	5.7	4.7
20	FLSSS0515 *	700.700	4351.800	H0630	700.650	4351.700	112	3.0	2.6
21	FLSSS0526	701.200	4351.800	H0735	701.150	4351.850	71	1.8	1.6
22	FLSSS0512	700.200	4351.900	H0823	700.150	4351.860	64	30.6	4.5
23	FLSSS0512	700.200	4351.900	H0924	700.190	4351.950	51	30.6	10.1
24	FLSSS2235	698.300	4352.300	H1107	698.210	4352.210	127	8.5	4.1
25	FLSSS0002 **	700.100	4352.300	H1122	700.040	4352.200	117	72.5	83.9
26	FLS-SS0009	700.100	4352.300	H1122	700.040	4352.200	117	17.1	83.9
27	FLS-SS0013	700.100	4352.300	H1122	700.040	4352.200	117	32.8	83.9
28	FLS-SS0017 *	700.100	4352.300	H1122	700.040	4352.200	117	61.8	83.9
29	FLS-SS0021 *	700.100	4352.300	H1122	700.040	4352.200	117	60.6	83.9
30	FLSSS0026	700.100	4352.300	H1122	700.040	4352.200	117	57.7	83.9
31	FLSSS0030	700.100	4352.300	H1122	700.040	4352.200	117	90.6	83.9
32	FLSSS0034	700.100	4352.300	H1122	700.040	4352.200	117	61.8	83.9
33	FLSSS0038	700.100	4352.300	H1122	700.040	4352.200	117	79.9	83.9
34	FLSSS0756 *	701.200	4352.300	H1135	701.180	4352.220	82	3.7	1.9
35	FLSSS0002 **	700.100	4352.300	H1223	700.150	4352.340	64	72.5	49.4
36	FLS-SS0009	700.100	4352.300	H1223	700.150	4352.340	64	17.1	49.4
37	FLS-SS0013	700.100	4352.300	H1223	700.150	4352.340	64	32.8	49.4
38	FLS-SS0017 *	700.100	4352.300	H1223	700.150	4352.340	64	61.8	49.4
39	FLS-SS0021 *	700.100	4352.300	H1223	700.150	4352.340	64	60.6	49.4
40	FLSSS0026	700.100	4352.300	H1223	700.150	4352.340	64	57.7	49.4
41	FLSSS0030	700.100	4352.300	H1223	700.150	4352.340	64	90.6	49.4
42	FLSSS0034	700.100	4352.300	H1223	700.150	4352.340	64	61.8	49.4
43	FLSSS0038	700.100	4352.300	H1223	700.150	4352.340	64	79.9	49.4
44	FLSSS0756 *	701.200	4352.300	H1336	701.190	4352.440	140	3.7	2.7
45	FLSSS0558	699.400	4353.400	H2117	699.500	4353.450	112	7.2	8.9
46	FLSSS0566	700.000	4353.500	H2121	699.930	4353.450	86	11.2	7.2

(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
** - AVERAGE OF 'FLSSS0002' AND 'FLSBS0003'
(2) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

TABLE 3.2
PAIRED 1986 AND 1984 SOIL SAMPLES

OBS	1986 FIELD SAMPLE NUMBER(1)	1986 UTM(2) E-W (KM)	1986 UTM(2) N-S (KM)	1984 FIELD SAMPLE NUMBER	1984 UTM(2) E-W (KM)	1984 UTM(2) N-S (KM)	DISTANCE BETWEEN SAMPLES (M)	1986 TOTAL URANIUM(3) P CI PER GM	1984 TOTAL URANIUM(3) P CI PER GM
47	FLSSS0072	700.200	4353.600	H2124	700.220	4353.460	141	10.5	5.6
48	FLSSS0760	701.800	4353.800	H2240	701.930	4353.780	132	2.6	3.5
49	FLSSS0526	701.200	4351.800	S-12-84	701.240	4351.810	41	1.8	1.8
50	FLS-SS-0258	695.700	4352.800	S-15-84	695.710	4352.820	22	1.0	13.2
51	FLSSS0774	702.400	4355.100	S-5-84	702.530	4355.060	136	0.7	3.7
52	FLSSS0782	702.900	4353.400	S-8-84	702.840	4353.350	78	2.1	2.0
53	FLSSS0558	699.400	4353.400	S-BS-1-84	699.400	4353.300	100	7.2	8.3
54	FLSSS0566	700.000	4353.500	S-BS-2-84	700.120	4353.470	124	11.2	10.6
55	FLSSS0002 **	700.100	4352.300	S-BS-3-84	700.070	4352.200	104	72.5	68.5
56	FLS-SS0009	700.100	4352.300	S-BS-3-84	700.070	4352.200	104	17.1	68.5
57	FLS-SS0013	700.100	4352.300	S-BS-3-84	700.070	4352.200	104	32.8	68.5
58	FLS-SS0017 *	700.100	4352.300	S-BS-3-84	700.070	4352.200	104	61.8	68.5
59	FLS-SS0021 *	700.100	4352.300	S-BS-3-84	700.070	4352.200	104	60.6	68.5
60	FLSSS0026	700.100	4352.300	S-BS-3-84	700.070	4352.200	104	57.7	68.5
61	FLSSS0030	700.100	4352.300	S-BS-3-84	700.070	4352.200	104	90.6	68.5
62	FLSSS0034	700.100	4352.300	S-BS-3-84	700.070	4352.200	104	61.8	68.5
63	FLSSS0038	700.100	4352.300	S-BS-3-84	700.070	4352.200	104	79.9	68.5
64	FLSSS0774	702.400	4355.100	SS-09	702.530	4355.060	136	0.7	4.1
65	FLSSS0512	700.200	4351.900	SS-11	700.200	4351.950	50	30.6	19.3
66	FLSSS0526	701.200	4351.800	SS-12	701.230	4351.830	42	1.8	2.5
67	FLS-SS-0258	695.700	4352.800	SS-15	695.710	4352.820	22	1.0	2.2

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(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
** - AVERAGE OF 'FLSSS0002' AND 'FLSBS0003'

TABLE 3.3
TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
BS-2	7.3	2-15	1.0	22.9	0-1	NE	700.120	4353.470
BS-3	39.9	2-15	0.4	70.7	0-1	NE	700.070	4352.200
H1023	8.7	2-15	0.4	82.9	0-1	NE	700.140	4352.080
H1122	83.9	2-15	0.4	69.7	0-1	NE	700.040	4352.200
H1124	10.4	2-15	0.5	74.7	0-1	NE	700.230	4352.200
H1223	49.4	2-15	0.5	62.4	0-1	NE	700.150	4352.340
H1225	29.5	2-15	0.5	67.2	0-1	NE	700.310	4352.340
H1227	12.5	2-15	0.6	70.2	0-1	NE	700.470	4352.350
H1322	13.2	2-15	0.4	48.7	0-1	NE	700.000	4352.440
H1326	11.0	2-15	0.6	63.7	0-1	NE	700.390	4352.440
H1423	10.2	2-15	0.5	49.9	0-1	NE	700.130	4352.530
H1522	14.1	2-15	0.5	39.2	0-1	NE	699.990	4352.600
H1524	10.9	2-15	0.6	49.0	0-1	NE	700.190	4352.600
H1623	7.7	2-15	0.6	41.5	0-1	NE	700.120	4352.700
H1722	38.1	2-15	0.6	34.0	0-1	NE	700.060	4352.830
H1724	9.6	2-15	0.7	40.9	0-1	NE	700.220	4352.830
H1726	10.2	2-15	0.8	47.6	0-1	NE	700.410	4352.830
H1823	27.6	2-15	0.7	32.2	0-1	NE	700.110	4352.970
H1924	6.3	2-15	0.8	35.4	0-1	NE	700.240	4353.040
H2018	14.7	2-15	0.8	3.3	0-1	NE	699.570	4353.210
H2022	6.5	2-15	0.8	24.1	0-1	NE	700.040	4353.210
H2026	8.1	2-15	0.9	36.3	0-1	NE	700.390	4353.210
H2117	8.9	2-15	0.9	0.0	0-1	NE	699.500	4353.450
H2119	7.1	2-15	0.9	8.6	0-1	NE	699.720	4353.450
H2121	7.2	2-15	0.9	16.5	0-1	NE	699.930	4353.450
S-28-84	13.8	2-15	0.4	83.1	0-1	NE	700.160	4352.080
S-BS-2-84	10.6	2-15	1.0	22.9	0-1	NE	700.120	4353.470
S-BS-3-84	68.5	2-15	0.4	70.7	0-1	NE	700.070	4352.200
FLSSS0002 **	72.5	0-2.5	0.4	63.4	0-1	NE	700.100	4352.300
FLSBS0003	71.0	2.5-5	0.4	63.4	0-1	NE	700.100	4352.300
FLSBS0004	32.8	5-7.5	0.4	63.4	0-1	NE	700.100	4352.300
FLSBS0005	7.6	7.5-10	0.4	63.4	0-1	NE	700.100	4352.300
FLSBS0006	3.4	10-12.5	0.4	63.4	0-1	NE	700.100	4352.300
FLSBS0007 *	3.0	12.5-15	0.4	63.4	0-1	NE	700.100	4352.300
FLS-SS0009	17.1	0-5	0.4	63.4	0-1	NE	700.100	4352.300
FLS-SS0013	32.8	0-5	0.4	63.4	0-1	NE	700.100	4352.300
FLS-SS0017 *	61.8	0-5	0.4	63.4	0-1	NE	700.100	4352.300
FLS-SS0021 *	60.6	0-5	0.4	63.4	0-1	NE	700.100	4352.300
FLSSS0026	57.7	0-5	0.4	63.4	0-1	NE	700.100	4352.300
FLSSS0030	90.6	0-5	0.4	63.4	0-1	NE	700.100	4352.300
FLSSS0034	61.8	0-5	0.4	63.4	0-1	NE	700.100	4352.300
FLSSS0038	79.9	0-5	0.4	63.4	0-1	NE	700.100	4352.300
FLSBS0039	30.5	5-10	0.4	63.4	0-1	NE	700.100	4352.300
FLSBS0040	68.9	10-15	0.4	63.4	0-1	NE	700.100	4352.300
FLSSS0566	11.2	0-5	1.0	18.4	0-1	NE	700.000	4353.500
BS-4	6.5	2-15	0.6	151.8	0-1	SE	699.950	4351.160

(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
** - AVERAGE OF 'FLSSS0002' AND 'FLSBS0003'
(2) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT
(3) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

TABLE 3.3
TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
H0220	2.2	2-15	0.8	164.4	0-1	SE	699.850	4350.750
H0222	3.1	2-15	0.9	153.6	0-1	SE	700.120	4350.750
H0226	2.6	2-15	1.0	144.5	0-1	SE	700.390	4350.750
H0317	4.4	2-15	0.7	177.3	0-1	SE	699.550	4350.920
H0324	5.1	2-15	0.8	142.9	0-1	SE	700.310	4350.930
H0418	3.0	2-15	0.5	169.6	0-1	SE	699.650	4351.180
H0420	5.1	2-15	0.6	156.0	0-1	SE	699.860	4351.190
H0422	4.0	2-15	0.6	145.3	0-1	SE	700.060	4351.190
H0426	3.0	2-15	0.8	131.1	0-1	SE	700.440	4351.180
H0528	3.8	2-15	0.7	110.5	0-1	SE	700.570	4351.600
H0622	10.8	2-15	0.4	119.4	0-1	SE	700.050	4351.690
H0630	2.6	2-15	0.7	104.6	0-1	SE	700.650	4351.700
H0722	16.0	2-15	0.4	114.1	0-1	SE	700.060	4351.750
H0724	4.4	2-15	0.5	107.3	0-1	SE	700.270	4351.760
H0731	5.3	2-15	0.7	91.4	0-1	SE	700.690	4351.970
H0733	4.2	2-15	0.9	98.3	0-1	SE	700.940	4351.790
H0823	4.5	2-15	0.4	102.2	0-1	SE	700.150	4351.860
H0922	20.9	2-15	0.3	95.3	0-1	SE	700.040	4351.950
H0924	10.1	2-15	0.4	94.1	0-1	SE	700.190	4351.950
H0934	1.2	2-15	1.0	91.9	0-1	SE	701.030	4351.950
S-BS-4-84	8.3	2-15	0.6	151.8	0-1	SE	699.950	4351.160
SS-11	19.3	2-15	0.4	94.1	0-1	SE	700.200	4351.950
FLSSS0512	30.6	0-5	0.4	98.1	0-1	SE	700.200	4351.900
FLSBS0515 *	3.0	0-5	0.8	99.5	0-1	SE	700.700	4351.800
FLSSS0519	3.6	0-5	0.7	131.6	0-1	SE	700.400	4351.200
FLSSS0522	3.9	0-5	0.6	135.0	0-1	SE	700.200	4351.300
FLS-SS-0533	1.8	0-5	0.9	109.7	0-1	SE	700.900	4351.500
FLS-SS-0540	3.7	0-5	0.6	168.7	0-1	SE	699.700	4351.000
FLS-SS-0543	3.3	0-5	0.9	167.9	0-1	SE	699.800	4350.600
FLSSS2227	25.1	0-5	0.3	158.2	0-1	SE	699.700	4351.500
BS-5	12.8	2-15	0.6	230.5	0-1	SW	698.760	4351.390
H0311	3.9	2-15	0.8	213.6	0-1	SW	698.770	4350.900
H0313	8.2	2-15	0.7	204.0	0-1	SW	699.020	4350.920
H0315	5.4	2-15	0.7	190.8	0-1	SW	699.300	4350.950
H0406	2.9	2-15	1.0	235.6	0-1	SW	698.200	4351.110
H0410	6.2	2-15	0.8	224.3	0-1	SW	698.650	4351.130
H0509	4.7	2-15	0.8	232.5	0-1	SW	698.510	4351.240
H0608	6.9	2-15	0.8	247.2	0-1	SW	698.380	4351.530
H0707	3.8	2-15	0.8	257.5	0-1	SW	698.240	4351.720
H0908	3.1	2-15	0.7	266.4	0-1	SW	698.390	4351.930
S-BS-5-84	5.4	2-15	0.6	230.5	0-1	SW	698.760	4351.390
FLSSS0501	5.7	0-5	0.8	235.0	0-1	SW	698.500	4351.300
FLS-SS-0537	4.2	0-5	0.8	202.6	0-1	SW	699.000	4350.800
FLSSS2223	20.7	0-5	0.5	200.6	0-1	SW	699.200	4351.200
BS-1	10.2	2-15	0.8	355.6	0-1	NW	699.400	4353.300
BS-6	1.5	2-15	0.6	284.7	0-1	NW	698.510	4352.260

(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
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(3) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

TABLE 3.3
TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
H1105	8.6	2-15	1.0	277.3	0-1	NW	697.940	4352.200
H1107	4.1	2-15	0.8	279.2	0-1	NW	698.210	4352.210
H1306	4.7	2-15	0.9	286.3	0-1	NW	698.130	4352.400
H1507	8.6	2-15	0.9	295.8	0-1	NW	698.220	4352.620
H1706	2.3	2-15	1.0	298.8	0-1	NW	698.100	4352.770
H2010	7.9	2-15	0.9	323.1	0-1	NW	698.590	4353.210
H2012	8.4	2-15	0.9	331.4	0-1	NW	698.840	4353.210
H2014	9.7	2-15	0.8	341.3	0-1	NW	699.090	4353.210
H2016	8.8	2-15	0.8	351.5	0-1	NW	699.320	4353.210
H2115	4.9	2-15	0.9	349.1	0-1	NW	699.220	4353.450
S-BS-1-84	8.3	2-15	0.8	355.6	0-1	NW	699.400	4353.300
S-BS-6-84	7.4	2-15	0.6	284.7	0-1	NW	698.510	4352.260
FLSSS0558	7.2	0-5	0.9	355.9	0-1	NW	699.400	4353.400
FLSSS2215	15.7	0-5	0.8	308.7	0-1	NW	698.500	4352.800
FLSSS2219	6.3	0-5	0.5	284.0	0-1	NW	698.700	4352.200
FLSSS2231 •	35.6	0-5	0.7	338.2	0-1	NW	699.100	4353.000
FLSSS2235	8.5	0-5	0.8	284.0	0-1	NW	698.300	4352.300
B0339	2.1	2-15	1.8	47.1	1-2	NE	701.620	4353.970
B0438	7.1	2-15	1.9	37.1	1-2	NE	701.340	4354.430
H0938	3.2	2-15	1.3	88.1	1-2	NE	701.580	4352.070
H1135	1.9	2-15	1.1	82.5	1-2	NE	701.180	4352.220
H1336	2.7	2-15	1.1	75.4	1-2	NE	701.190	4352.440
H2032	13.8	2-15	1.1	48.5	1-2	NE	700.870	4353.210
H2124	5.6	2-15	1.0	26.3	1-2	NE	700.220	4353.460
H2131	13.1	2-15	1.2	39.3	1-2	NE	700.720	4353.490
H2222	5.8	2-15	1.1	17.6	1-2	NE	700.050	4353.730
H2230	4.4	2-15	1.3	31.7	1-2	NE	700.580	4353.750
H2234	6.0	2-15	1.4	40.5	1-2	NE	701.010	4353.770
H2238	9.0	2-15	1.6	46.3	1-2	NE	701.350	4353.770
H2240	3.5	2-15	1.9	53.8	1-2	NE	701.930	4353.780
FLSSS0072	10.5	0-5	1.1	23.6	1-2	NE	700.200	4353.600
FLSSS0076 •	2.5	0-5	1.8	62.5	1-2	NE	702.000	4353.300
FLSSS0562	8.3	0-5	1.2	3.0	1-2	NE	699.600	4353.900
FLSSS0570	3.1	0-5	1.3	10.8	1-2	NE	699.900	4354.100
FLSSS0748	1.6	0-5	2.0	61.8	1-2	NE	702.300	4353.500
FLSSS0752	1.7	0-5	1.4	71.6	1-2	NE	701.600	4352.700
FLSSS0756 •	3.7	0-5	1.1	80.0	1-2	NE	701.200	4352.300
FLSSS0760	2.6	0-5	1.8	52.0	1-2	NE	701.800	4353.800
FLSSS0763	2.6	0-5	1.5	43.4	1-2	NE	701.200	4353.800
FLSSS0766	1.9	0-5	1.3	37.4	1-2	NE	700.800	4353.700
H0122	5.3	2-15	1.1	157.7	1-2	SE	700.160	4350.390
H0232	3.7	2-15	1.2	131.7	1-2	SE	700.970	4350.690
H0636	1.6	2-15	1.1	102.5	1-2	SE	701.300	4351.600
H0735	1.6	2-15	1.0	95.2	1-2	SE	701.150	4351.850
S-12-84	1.8	2-15	1.1	96.2	1-2	SE	701.240	4351.810
SS-12	2.5	2-15	1.1	95.6	1-2	SE	701.230	4351.830

(1) • - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
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(3) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

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TABLE 3.3
TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
FLSSS0504	1.5	0-5	1.2	165.3	1-2	SE	700.000	4350.100
FLSSS0526	1.8	0-5	1.1	96.7	1-2	SE	701.200	4351.800
FLSSS0530	1.5	0-5	1.3	110.2	1-2	SE	701.400	4351.300
FLSSS0850	2.5	0-5	2.0	91.8	1-2	SE	702.700	4351.900
FLSSS0854	0.9	0-5	1.9	103.1	1-2	SE	702.500	4351.300
FLSSS0857	0.7	0-5	1.9	113.2	1-2	SE	702.300	4350.800
FLSSS0041 *	1.7	0-5	2.0	223.7	1-2	SW	697.300	4349.700
FLSSS0044 *	1.3	0-5	2.0	223.7	1-2	SW	697.300	4349.700
FLSSS0047	1.4	0-5	2.0	223.7	1-2	SW	697.300	4349.700
FLSSS0050	1.4	0-5	2.0	223.7	1-2	SW	697.300	4349.700
FLSSS0053	1.1	0-5	2.0	223.7	1-2	SW	697.300	4349.700
FLSBS0055	1.3	10-15	2.0	223.7	1-2	SW	697.300	4349.700
FLSSS0059	0.9	0-5	2.0	223.7	1-2	SW	697.300	4349.700
FLSSS0062	1.2	0-5	2.0	223.7	1-2	SW	697.300	4349.700
FLSSS0065 *	1.2	0-2.5	2.0	223.7	1-2	SW	697.300	4349.700
FLSBS0066	1.4	2.5-5	2.0	223.7	1-2	SW	697.300	4349.700
FLSBS0067	0.9	5-7.6	2.0	223.7	1-2	SW	697.300	4349.700
FLSBS0068 *	1.2	7.6-10	2.0	223.7	1-2	SW	697.300	4349.700
FLSBS0069	1.0	10-13	2.0	223.7	1-2	SW	697.300	4349.700
FLSBS0070	1.3	13-15	2.0	223.7	1-2	SW	697.300	4349.700
FLSSS0080	0.8	0-5	1.7	241.6	1-2	SW	697.100	4350.700
FLSSS0188	7.3	0-5	1.1	234.5	1-2	SW	698.100	4351.000
FLS-SS-0242 *	5.4	0-5	1.4	241.2	1-2	SW	697.500	4350.900
FLSSS0508	3.6	0-5	1.1	189.5	1-2	SW	699.200	4350.200
FLS-SS-0547	3.9	0-5	1.7	232.3	1-2	SW	697.300	4350.300
FLS-SS-0551 *	1.5	0-5	1.8	213.7	1-2	SW	697.900	4349.600
FLSSS0554	0.8	0-5	1.5	201.4	1-2	SW	698.600	4349.700
FLS-SS2172	2.4	0-5	1.7	257.0	1-2	SW	696.900	4351.400
B0408	2.3	2-15	1.7	328.3	1-2	NW	698.100	4354.270
BS-7	3.5	2-15	1.1	311.1	1-2	NW	698.180	4353.150
H1702	2.3	2-15	1.2	293.4	1-2	NW	697.700	4352.780
H1905	2.3	2-15	1.2	303.7	1-2	NW	697.940	4353.040
H1907	3.2	2-15	1.0	309.1	1-2	NW	698.220	4353.040
H2004	1.7	2-15	1.3	305.8	1-2	NW	697.820	4353.210
H2006	3.6	2-15	1.1	311.5	1-2	NW	698.130	4353.210
H2008	4.6	2-15	1.0	316.5	1-2	NW	698.350	4353.210
H2105	3.0	2-15	1.3	312.7	1-2	NW	697.950	4353.430
H2206	2.5	2-15	1.4	318.9	1-2	NW	698.060	4353.650
S-BS-7-84	3.3	2-15	1.1	311.1	1-2	NW	698.180	4353.150
FLSSS0172	3.8	0-5	1.8	328.0	1-2	NW	698.000	4354.400
FLSSS0342	2.6	0-5	1.3	337.2	1-2	NW	698.700	4353.900
FLS-SS-2176	0.6	0-5	1.6	274.4	1-2	NW	696.900	4352.200
FLS-SS-2180 *	2.6	0-5	2.0	273.6	1-2	NW	696.300	4352.200
B0244	2.0	2-15	2.3	66.4	2-3	NE	702.950	4353.510
B0246	3.6	2-15	2.6	69.1	2-3	NE	703.420	4353.500
B0341	2.8	2-15	2.1	53.6	2-3	NE	702.170	4353.970

(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
** - AVERAGE OF 'FLSSS0002' AND 'FLSBS0003'
(2) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT
(3) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

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TABLE 3.3
TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
B0343	3.5	2-15	2.4	58.8	2-3	NE	702.750	4353.970
B0345	11.0	2-15	2.6	62.3	2-3	NE	703.250	4353.970
B0347	2.3	2-15	2.9	65.1	2-3	NE	703.750	4353.970
B0440	4.8	2-15	2.1	45.6	2-3	NE	701.930	4354.380
B0442	3.9	2-15	2.4	49.6	2-3	NE	702.460	4354.520
B0444	5.1	2-15	2.6	53.8	2-3	NE	702.920	4354.500
B0446	4.2	2-15	2.9	58.1	2-3	NE	703.500	4354.490
B0539	3.4	2-15	2.2	35.6	2-3	NE	701.590	4354.920
B0640	2.4	2-15	2.5	35.2	2-3	NE	701.860	4355.350
H2242	5.9	2-15	2.1	60.8	2-3	NE	702.490	4353.670
S-5-84	3.7	2-15	2.7	44.7	2-3	NE	702.530	4355.060
S-7-84	3.1	2-15	2.7	14.4	2-3	NE	700.590	4356.230
S-8-84	2.0	2-15	2.2	68.0	2-3	NE	702.840	4353.350
SS-08	1.9	2-15	2.7	14.7	2-3	NE	700.610	4356.230
SS-09	4.1	2-15	2.7	44.7	2-3	NE	702.530	4355.060
SS-10	3.9	2-15	2.3	72.2	2-3	NE	702.980	4353.120
FLS-SS0168	2.3	0-5	2.8	0.0	2-3	NE	699.500	4356.500
FLS-SS-0366	1.4	0-5	2.6	36.3	2-3	NE	702.000	4355.400
FLS-SS-0370	4.4	0-5	2.5	27.8	2-3	NE	701.400	4355.600
FLS-SS-0374	1.1	0-5	2.6	18.0	2-3	NE	700.800	4356.000
FLS-SS0378	2.4	0-5	2.9	9.9	2-3	NE	700.300	4356.600
FLS-SS-0382	1.9	0-5	2.6	8.1	2-3	NE	700.100	4356.200
FLS-SS-0386	1.9	0-5	2.9	16.5	2-3	NE	700.800	4356.400
FLS-SS-0394	2.2	0-5	2.9	29.3	2-3	NE	701.800	4356.100
FLSSS0574	1.7	0-5	2.0	42.5	2-3	NE	701.700	4354.400
FLSSS0744	2.7	0-5	2.6	55.9	2-3	NE	702.900	4354.300
FLSSS0774	0.7	0-5	2.6	43.1	2-3	NE	702.400	4355.100
FLSSS0778	1.5	0-5	2.3	55.0	2-3	NE	702.500	4354.100
FLSSS0782	2.1	0-5	2.3	67.6	2-3	NE	702.900	4353.400
FLSSS0786	1.7	0-5	2.8	64.0	2-3	NE	703.600	4354.000
FLSSS0840	1.8	0-5	2.9	77.5	2-3	NE	704.000	4353.000
FLSSS0844	2.7	0-5	2.5	77.0	2-3	NE	703.400	4352.900
FLSSS0847	2.5	0-5	2.1	81.4	2-3	NE	702.800	4352.500
FLSSS0861	2.2	0-5	2.2	124.6	2-3	SE	702.400	4350.000
FLSSS0865	1.1	0-5	2.5	130.0	2-3	SE	702.600	4349.400
FLSSS0869	0.7	0-5	2.8	137.7	2-3	SE	702.500	4348.700
FLSSS0872 *	1.1	0-5	2.9	145.6	2-3	SE	702.100	4348.200
FLSSS0875	0.9	0-5	2.7	155.8	2-3	SE	701.300	4348.000
FLSSS0879	1.0	0-5	2.5	162.5	2-3	SE	700.700	4348.200
FLSSS0882	0.9	0-5	2.3	172.3	2-3	SE	700.000	4348.300
FLSSS0956	1.0	0-5	2.4	154.1	2-3	SE	701.200	4348.500
FLSSS0960	1.4	0-5	2.2	161.6	2-3	SE	700.600	4348.700
FLSSS0963	0.7	0-5	2.6	145.9	2-3	SE	701.800	4348.600
FLSSS0966	1.0	0-5	2.3	139.4	2-3	SE	701.900	4349.200
FLSSS0969	1.1	0-5	2.5	121.7	2-3	SE	702.900	4349.900
FLSSS0973 **	1.4	0-5	2.9	118.2	2-3	SE	703.600	4349.800

(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
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(3) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

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TABLE 3.3

TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
FLSSS0995	1.6	0-5	2.8	96.3	2-3	SE	704.000	4351.500
FLSSS0998 •	2.0	0-5	2.5	99.9	2-3	SE	703.500	4351.300
FLSSS2002 •	1.3	0-5	2.2	102.9	2-3	SE	703.000	4351.200
FLSSS2006 •	1.2	0-5	2.7	107.6	2-3	SE	703.600	4350.700
FLSSS2050	0.7	0-5	2.1	150.5	2-3	SE	701.200	4349.000
FLSSS2054	1.1	0-5	2.9	152.4	2-3	SE	701.700	4347.800
CFIS-1	4.8	2-15	2.2	228.0	2-3	SW	696.910	4349.670
CFIS-2	1.7	2-15	2.2	229.2	2-3	SW	696.850	4349.710
CFIS-3	1.0	2-15	2.1	229.5	2-3	SW	696.920	4349.800
CFIS-4	4.1	2-15	2.1	228.3	2-3	SW	696.950	4349.730
S-17-84	2.1	2-15	2.2	187.0	2-3	SW	699.060	4348.430
SE-14	2.3	2-15	2.1	185.4	2-3	SW	699.180	4348.610
FLS-SS-0202	3.3	0-5	2.2	246.4	2-3	SW	696.300	4350.600
FLS-SS-0206 •	1.7	0-5	2.5	246.6	2-3	SW	695.800	4350.400
FLS-SS-0210	5.3	0-5	2.8	241.7	2-3	SW	695.600	4349.900
FLS-SS-0246	2.2	0-5	2.4	255.3	2-3	SW	695.700	4351.000
FLS-SS-0250	1.0	0-5	2.4	265.5	2-3	SW	695.700	4351.700
FLSSS0603	0.7	0-5	2.9	198.4	2-3	SW	698.000	4347.500
FLSSS0886	1.0	0-5	2.4	181.5	2-3	SW	699.400	4348.100
FLSSS0889	1.4	0-5	2.8	187.8	2-3	SW	698.900	4347.600
FLSSS0934 •	1.0	0-5	2.9	204.3	2-3	SW	697.600	4347.800
FLSSS0938	1.1	0-5	2.6	209.1	2-3	SW	697.500	4348.400
FLSSS0942	1.2	0-5	2.3	216.3	2-3	SW	697.300	4349.000
FLSSS0946	0.7	0-5	2.7	195.9	2-3	SW	698.300	4347.800
FLSSS0949	1.0	0-5	2.4	192.2	2-3	SW	698.700	4348.300
FLSSS0952	3.5	0-5	2.1	183.5	2-3	SW	699.300	4348.700
S-15-84	13.2	2-15	2.4	282.2	2-3	NW	695.710	4352.820
SE-15	2.2	2-15	2.4	282.2	2-3	NW	695.710	4352.820
FLSSS0084	1.1	0-5	2.9	339.6	2-3	NW	697.900	4356.300
FLSSS0088	1.1	0-5	3.0	337.8	2-3	NW	697.700	4356.400
FLSSS0176 •	2.8	0-5	2.1	333.4	2-3	NW	698.000	4355.000
FLSSS0180	1.6	0-5	2.5	336.6	2-3	NW	697.900	4355.700
FLS-SS-0254	1.8	0-5	2.4	274.5	2-3	NW	695.700	4352.300
FLS-SS-0258	1.0	0-5	2.4	281.9	2-3	NW	695.700	4352.800
FLS-SS-0262	1.9	0-5	2.6	291.0	2-3	NW	695.600	4353.500
FLS-SS-0266 •	1.4	0-5	2.8	298.3	2-3	NW	695.600	4354.100
FLS-SS-0274	0.9	0-5	2.9	303.7	2-3	NW	695.600	4354.600
FLS-SS-0278	1.3	0-5	2.9	314.1	2-3	NW	696.200	4355.200
FLS-SS-0282	1.3	0-5	2.6	320.9	2-3	NW	696.900	4355.200
FLS-SS0286	0.9	0-5	2.9	328.0	2-3	NW	697.000	4356.000
FLS-SS-0294	1.0	0-5	2.3	328.0	2-3	NW	697.500	4355.200
FLS-SS-0298	2.2	0-5	2.3	346.0	2-3	NW	698.600	4355.600
FLS-SS0302	3.5	0-5	2.5	352.9	2-3	NW	699.000	4356.000
FLS-SS-0362	0.9	0-5	3.0	345.4	2-3	NW	698.300	4356.600
B0448	2.7	2-15	3.2	60.6	3-4	NE	704.000	4354.540
SS 13	1.1	2-15	3.3	89.4	3-4	NE	704.880	4352.060

(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES

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TABLE 3.3
TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
FLS-SS-0128 *	1.6	0-5	3.2	2.2	3-4	NE	699.700	4357.200
FLSSS0144	1.4	0-5	3.4	0.0	3-4	NE	699.500	4357.500
FLS-SS-0310	1.7	0-5	3.6	4.9	3-4	NE	700.000	4357.800
FLS-SS-0390	1.4	0-5	3.2	18.1	3-4	NE	701.100	4356.900
FLS-SS-0398 *	2.9	0-5	3.3	25.6	3-4	NE	701.800	4356.800
FLS-SS-0402	1.2	0-5	3.6	25.7	3-4	NE	702.000	4357.200
FLS-SS0406	0.8	0-5	3.8	32.9	3-4	NE	702.800	4357.100
FLSSS0410	1.1	0-5	3.8	36.3	3-4	NE	703.100	4356.900
FLSSS0418	1.1	0-5	3.4	40.6	3-4	NE	703.100	4356.200
FLSSS0587	1.8	0-5	3.8	48.3	3-4	NE	704.100	4356.100
FLSSS0591	1.4	0-5	3.7	80.4	3-4	NE	705.400	4353.000
FLSSS0595	1.4	0-5	3.8	70.1	3-4	NE	705.300	4354.100
FLSSS0620	1.2	0-5	4.0	84.6	3-4	NE	705.900	4352.600
FLSSS0624	2.1	0-5	3.8	75.7	3-4	NE	705.400	4353.500
FLSSS0664	1.1	0-5	3.2	56.9	3-4	NE	703.800	4354.800
FLSSS0687 *	1.2	0-5	3.4	69.9	3-4	NE	704.700	4353.900
FLSSS0691	1.3	0-5	3.1	65.0	3-4	NE	704.000	4354.100
FLSSS0699	1.9	0-5	3.4	46.5	3-4	NE	703.500	4355.800
FLSSS0703	1.4	0-5	3.7	41.6	3-4	NE	703.500	4356.500
FLSSS0710	3.2	0-5	3.9	24.5	3-4	NE	702.100	4357.700
FLSSS0714	1.5	0-5	3.6	20.0	3-4	NE	701.500	4357.500
FLSSS0740	1.5	0-5	3.0	53.4	3-4	NE	703.400	4354.900
FLSSS0789	1.7	0-5	3.3	48.1	3-4	NE	703.400	4355.500
FLSSS0792	1.4	0-5	3.2	71.9	3-4	NE	704.400	4353.600
FLSSS0795	1.1	0-5	3.4	77.2	3-4	NE	704.800	4353.200
FLSSS0798	1.0	0-5	3.5	82.9	3-4	NE	705.100	4352.700
FLSSS0801 *	0.8	0-5	3.8	89.1	3-4	NE	705.600	4352.100
FLSSS0837 *	2.2	0-5	3.2	85.6	3-4	NE	704.700	4352.400
S-24-84	6.5	2-15	3.8	97.4	3-4	SE	705.600	4351.210
FLSSS0831	0.6	0-5	3.9	100.1	3-4	SE	705.700	4350.900
FLSSS0834	0.9	0-5	3.7	91.9	3-4	SE	705.400	4351.800
FLSSS0922	0.8	0-5	3.5	177.0	3-4	SE	699.800	4346.300
FLSSS0926	1.2	0-5	3.6	170.0	3-4	SE	700.500	4346.300
FLSSS0930	1.1	0-5	4.0	171.0	3-4	SE	700.500	4345.700
FLSSS0977	1.0	0-5	3.3	116.6	3-4	SE	704.300	4349.600
FLSSS0980	0.5	0-5	3.8	116.1	3-4	SE	705.000	4349.300
FLSSS0991	1.5	0-5	3.2	93.3	3-4	SE	704.700	4351.700
FLSSS2010	0.9	0-5	3.1	111.4	3-4	SE	704.100	4350.200
FLSSS2014	0.9	0-5	3.1	137.4	3-4	SE	702.900	4348.300
FLSSS2017	0.8	0-5	3.3	146.6	3-4	SE	702.400	4347.600
FLSSS2021	1.3	0-5	3.5	142.1	3-4	SE	703.000	4347.500
FLSSS2024 *	1.3	0-5	3.7	147.4	3-4	SE	702.700	4347.000
FLSSS2028	0.8	0-5	3.6	135.0	3-4	SE	703.600	4347.900
FLSSS2036	1.0	0-5	3.1	128.5	3-4	SE	703.400	4348.900
FLSSS2043	0.7	0-5	4.0	134.4	3-4	SE	704.100	4347.500
FLSSS2046	1.2	0-5	3.4	125.4	3-4	SE	704.000	4348.800

(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
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TABLE 3.3
TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
FLSSS2058	1.0	0-5	3.2	158.4	3-4	SE	701.400	4347.200
FLSSS2062	0.9	0-5	3.4	165.2	3-4	SE	700.900	4346.700
FLSSS2069	0.6	0-5	4.0	144.6	3-4	SE	703.200	4346.800
FLSSS2072	0.7	0-5	3.9	139.5	3-4	SE	703.600	4347.200
FLSSS2091	1.0	0-5	3.3	99.8	3-4	SE	704.700	4351.100
FLSSS2094	1.2	0-5	3.6	97.9	3-4	SE	705.300	4351.200
FLSSS2109	1.1	0-5	3.9	150.6	3-4	SE	702.600	4346.500
FLSSS2120	1.3	0-5	3.7	159.1	3-4	SE	701.600	4346.500
FLSSS2123	1.1	0-5	3.9	164.4	3-4	SE	701.200	4345.900
FLS-SS-0214	2.6	0-5	3.2	243.4	3-4	SW	694.900	4349.700
FLS-SS-0218	1.8	0-5	3.6	241.2	3-4	SW	694.400	4349.200
FLS-SS-0450 *	1.0	0-5	4.0	234.6	3-4	SW	694.300	4348.300
FLS-SS-0454	0.8	0-5	3.9	230.2	3-4	SW	694.700	4348.000
FLS-SS-0458	1.3	0-5	3.7	220.9	3-4	SW	695.600	4347.500
FLS-SS-0462	1.0	0-5	3.6	214.5	3-4	SW	696.200	4347.200
FLS-SS-0466	1.0	0-5	3.1	221.7	3-4	SW	696.200	4348.300
FLS-SS0470	0.9	0-5	3.4	219.8	3-4	SW	696.000	4347.800
FLS-SS0474 *	1.2	0-5	3.9	207.8	3-4	SW	696.600	4346.500
FLSSS0599	2.1	0-5	3.5	204.3	3-4	SW	697.200	4346.900
FLSSS0893	0.6	0-5	3.2	188.9	3-4	SW	698.700	4346.900
FLSSS0896	1.0	0-5	3.5	193.3	3-4	SW	698.200	4346.500
FLSSS0899	1.6	0-5	4.0	193.6	3-4	SW	698.000	4345.800
FLSSS0914	0.9	0-5	3.9	186.3	3-4	SW	698.800	4345.700
FLSSS0918	1.2	0-5	3.6	183.0	3-4	SW	699.200	4346.200
FLS-SS2148	0.8	0-5	3.7	269.0	3-4	SW	693.500	4351.900
FLS-SS-2184	1.1	0-5	3.7	211.3	3-4	SW	696.400	4346.900
FLSSS0092	1.0	0-5	3.5	351.7	3-4	NW	698.700	4357.500
FLS-SS-0108	0.7	0-5	3.0	340.8	3-4	NW	697.900	4356.600
FLSSS0132	1.0	0-5	3.4	344.2	3-4	NW	698.000	4357.300
FLSSS0136	0.6	0-5	3.4	345.2	3-4	NW	698.100	4357.300
FLSSS0148	1.1	0-5	3.4	354.8	3-4	NW	699.000	4357.500
FLSSS0152	0.5	0-5	3.3	357.8	3-4	NW	699.300	4357.300
FLSSS0184	1.2	0-5	3.8	344.8	3-4	NW	697.900	4357.900
FLS-SS-0270	1.1	0-5	3.1	309.4	3-4	NW	695.600	4355.200
FLS-SS-0290 *	0.8	0-5	3.0	319.1	3-4	NW	696.300	4355.700
FLSSS0318	0.9	0-5	3.4	332.0	3-4	NW	696.900	4356.900
FLSSS0322	0.9	0-5	3.9	333.8	3-4	NW	696.700	4357.700
FLS-SS0354	2.4	0-5	3.1	356.6	3-4	NW	699.200	4357.000
FLS-SS-0358 **	2.3	0-5	3.0	351.7	3-4	NW	698.800	4356.800
FLS-SS0422	1.7	0-5	3.5	315.7	3-4	NW	695.600	4356.000
FLS-SS0426	0.8	0-5	3.8	313.0	3-4	NW	695.000	4356.200
FLS-SS0478	0.7	0-5	3.4	280.5	3-4	NW	694.100	4353.000
FLS-SS0482	0.9	0-5	3.5	285.3	3-4	NW	694.000	4353.500
FLS-SS0486	1.0	0-5	3.6	293.1	3-4	NW	694.100	4354.300
FLS-SS-0490	0.9	0-5	3.8	297.0	3-4	NW	694.000	4354.800
FLS-SS-0494	0.6	0-5	3.7	301.8	3-4	NW	694.500	4355.100

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(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
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(3) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

TABLE 3.3
TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
FLS-SS-0498	0.9	0-5	3.7	309.6	3-4	NW	694.900	4355.800
FLS-SS2144	0.9	0-5	3.4	274.2	3-4	NW	694.000	4352.400
B1047	3.4	2-15	4.4	39.8	4-5	NE	704.040	4357.450
B1152	1.7	2-15	5.2	43.2	4-5	NE	705.280	4358.150
FLS-SS-0112	1.2	0-5	5.0	0.7	4-5	NE	699.600	4360.100
FLS-SS-0306	0.9	0-5	4.0	0.9	4-5	NE	699.600	4358.500
FLS-SS-0314 *	0.9	0-5	4.0	6.2	4-5	NE	700.200	4358.400
FLSSS0338	1.5	0-5	5.3	2.0	4-5	NE	699.800	4360.600
FLSSS0414	1.6	0-5	4.1	33.9	4-5	NE	703.200	4357.500
FLSSS0577 **	3.5	0-5	4.0	50.6	4-5	NE	704.500	4356.100
FLSSS0580	1.0	0-5	4.1	48.7	4-5	NE	704.500	4356.400
FLSSS0583	0.9	0-5	4.1	47.4	4-5	NE	704.400	4356.500
FLSSS0607	1.3	0-5	4.4	43.3	4-5	NE	704.300	4357.100
FLSSS0610	2.9	0-5	4.2	44.4	4-5	NE	704.200	4356.800
FLSSS0613	1.3	0-5	4.4	47.3	4-5	NE	704.700	4356.800
FLSSS0617	1.6	0-5	4.5	39.9	4-5	NE	704.100	4357.500
FLSSS0628	1.3	0-5	4.1	78.5	4-5	NE	705.900	4353.300
FLSSS0631	1.1	0-5	4.1	71.3	4-5	NE	705.700	4354.100
FLSSS0634	1.6	0-5	4.3	70.5	4-5	NE	706.000	4354.300
FLSSS0638	1.6	0-5	4.8	69.4	4-5	NE	706.700	4354.700
FLSSS0641 *	1.3	0-5	4.2	74.5	4-5	NE	706.000	4353.800
FLSSS0645	1.1	0-5	4.0	90.0	4-5	NE	706.000	4352.000
FLSSS0648	1.3	0-5	4.5	76.3	4-5	NE	706.500	4353.700
FLSSS0652	0.9	0-5	4.7	83.2	4-5	NE	707.000	4352.900
FLSSS0672	1.2	0-5	4.8	46.0	4-5	NE	705.100	4357.400
FLSSS0675	0.9	0-5	5.2	43.1	4-5	NE	705.200	4358.100
FLSSS0679	1.0	0-5	4.6	33.9	4-5	NE	703.600	4358.100
FLSSS0683	0.7	0-5	4.8	28.9	4-5	NE	703.200	4358.700
FLSSS0695	0.8	0-5	5.2	36.3	4-5	NE	704.500	4358.800
FLSSS0706	1.1	0-5	4.1	20.7	4-5	NE	701.800	4358.100
FLSSS0717	1.9	0-5	4.4	23.3	4-5	NE	702.300	4358.500
FLSSS0720	1.5	0-5	4.8	24.3	4-5	NE	702.700	4359.100
FLSSS0723	1.0	0-5	5.2	25.6	4-5	NE	703.100	4359.500
FLSSS0726 *	1.1	0-5	5.0	19.8	4-5	NE	702.200	4359.500
FLSSS0730	1.3	0-5	5.1	16.9	4-5	NE	701.900	4359.900
FLSSS0733	1.7	0-5	4.9	14.7	4-5	NE	701.500	4359.600
FLSSS0736	1.7	0-5	4.6	10.9	4-5	NE	700.900	4359.300
FLSSS0804	1.2	0-5	4.3	95.0	4-5	SE	706.400	4351.400
FLSSS0808	1.2	0-5	4.5	99.6	4-5	SE	706.600	4350.800
FLSSS0812	1.2	0-5	4.6	105.7	4-5	SE	706.600	4350.000
FLSSS0816	1.2	0-5	4.8	110.3	4-5	SE	706.800	4349.300
FLSSS0820	0.8	0-5	4.8	115.2	4-5	SE	706.500	4348.700
FLSSS0824	0.5	0-5	4.6	109.9	4-5	SE	706.400	4349.500
FLSSS0827	0.8	0-5	4.2	105.5	4-5	SE	706.000	4350.200
FLSSS0984	0.7	0-5	4.2	115.4	4-5	SE	705.600	4349.100
FLSSS0987	0.7	0-5	4.6	114.8	4-5	SE	706.200	4348.900

(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
** - AVERAGE OF 'FLSSS0002' AND 'FLSBS0003'
(2) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT
(3) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

TABLE 3.3
TOTAL URANIUM IN SOILS BY QUADRANT AND DISTANCE FROM FMPC SITE

FIELD SAMPLE NUMBER(1)	TOTAL URANIUM(2) P CI PER GM	DEPTH RANGE CM	DISTANCE MILES FROM SITE	DIRECTION DEGREES NORTH=0	ANNULAR RING MILES	QUADRANT	UTM(3) E-W (KM)	UTM(3) N-S (KM)
FLSSS2040 •	0.9	0-5	4.1	127.6	4-5	SE	704.700	4348.000
FLSSS2080	0.8	0-5	4.8	138.2	4-5	SE	704.600	4346.300
FLSSS2087	1.0	0-5	4.9	134.5	4-5	SE	705.100	4346.500
FLSSS2098 •	0.9	0-5	4.4	122.8	4-5	SE	705.400	4348.200
FLSSS2105	1.2	0-5	5.0	120.7	4-5	SE	706.400	4347.900
FLSSS2112	1.0	0-5	4.3	150.5	4-5	SE	702.900	4346.000
FLSSS2116 •	1.2	0-5	4.7	148.0	4-5	SE	703.500	4345.600
FLS-SS-0222	1.3	0-5	4.0	239.5	4-5	SW	693.900	4348.700
FLS-SS-0226 •	1.3	0-5	4.4	243.1	4-5	SW	693.200	4348.800
FLS-SS-0230	1.4	0-5	4.8	244.4	4-5	SW	692.600	4348.700
FLS-SS-0234	1.5	0-5	5.2	243.7	4-5	SW	692.000	4348.300
FLS-SS-0238	1.0	0-5	5.4	244.0	4-5	SW	691.700	4348.200
FLSSS0903	0.8	0-5	4.4	188.9	4-5	SW	698.400	4345.000
FLSSS0906 •	0.8	0-5	4.7	186.0	4-5	SW	698.700	4344.400
FLSSS0910	0.8	0-5	5.2	184.1	4-5	SW	698.900	4343.700
FLS-SS2152	0.9	0-5	4.1	266.5	4-5	SW	692.900	4351.600
FLS-SS2156	1.2	0-5	4.1	262.2	4-5	SW	692.900	4351.100
FLS-SS2160	1.3	0-5	4.2	257.2	4-5	SW	692.900	4350.500
FLS-SS2164	1.6	0-5	4.3	252.3	4-5	SW	692.900	4349.900
FLS-SS-2168	1.1	0-5	4.5	247.0	4-5	SW	692.900	4349.200
FLS-SS-0096	0.8	0-5	4.6	353.8	4-5	NW	698.700	4359.400
FLS-SS-0100	0.9	0-5	5.2	348.3	4-5	NW	697.800	4360.200
FLS-SS-0104	0.9	0-5	5.4	348.7	4-5	NW	697.800	4360.500
FLS-SS0116	0.7	0-5	4.2	346.4	4-5	NW	697.900	4358.600
FLS-SS-0120	1.2	0-5	5.3	349.9	4-5	NW	698.000	4360.400
FLS-SS-0124 *	1.2	0-5	5.4	350.8	4-5	NW	698.100	4360.600
FLSSS0140	0.7	0-5	4.9	348.3	4-5	NW	697.900	4359.700
FLS-SS-0156	1.3	0-5	5.0	342.7	4-5	NW	697.100	4359.700
FLS-SS-0160	1.3	0-5	4.9	339.3	4-5	NW	696.700	4359.400
FLS-SS0164	1.5	0-5	5.1	340.0	4-5	NW	696.700	4359.700
FLSSS0326	1.1	0-5	4.3	336.8	4-5	NW	696.800	4358.300
FLSSS0330	1.1	0-5	4.5	341.3	4-5	NW	697.200	4358.800
FLSSS0334	1.1	0-5	4.5	347.3	4-5	NW	697.900	4359.100
FLSSS0346	0.6	0-5	4.6	350.7	4-5	NW	698.300	4359.300
FLS-SS0350	1.0	0-5	4.6	351.5	4-5	NW	698.400	4359.400
FLS-SS-0430	1.3	0-5	4.2	312.6	4-5	NW	694.500	4356.600
FLS-SS-0434 •	0.7	0-5	4.5	311.1	4-5	NW	694.000	4356.800
FLS-SS-0438	0.8	0-5	4.9	308.9	4-5	NW	693.300	4357.000
FLS-SS-0442	0.9	0-5	5.8	309.3	4-5	NW	692.300	4357.900
FLS-SS0446	0.8	0-5	5.4	308.5	4-5	NW	692.700	4357.400
FLS-SS2128	1.1	0-5	4.3	317.3	4-5	NW	694.800	4357.100
FLS-SS2132	0.8	0-5	4.6	321.0	4-5	NW	694.800	4357.800
FLS-SS2136	0.9	0-5	5.0	323.1	4-5	NW	694.700	4358.400
FLS-SS2140	0.9	0-5	5.3	325.6	4-5	NW	694.700	4359.000

(1) * - AVERAGE OF REPLICATE OR DUPLICATE ANALYSES
** - AVERAGE OF 'FLSSS0002' AND 'FLSBS0003'
(2) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT
(3) UTM - UNIVERSAL TRANSVERSE MERCATOR COORDINATE SYSTEM

TABLE 4.2
GROUND WATER SAMPLE TOTAL URANIUM CONCENTRATIONS

.5pc/l

15 = PS
125 = 11K (5)
21 = MVRM
8 = COLL 2
9 = COLL 1
17 = AW

FIELD SAMPLE NUMBER	LABORATORY (1) SAMPLE NUMBER	STATE (2) PLANE E-W(FT)	STATE (2) PLANE N-S(FT)	SAMPLE COLLECTION DATE	TOTAL (3) URANIUM P CI PER LITER
FLSGW-0013-D	7216	1382100	481710	07MAR86	0.91
FLSGW-0013-S	7217	1382100	481700	07MAR86	0.20 ●
FLSGW-0013-S	7218	1382100	481700	07MAR86	0.25
FLSGW-0018-D	7219	1378650	479300	06MAR86	0.57
FLSGW-0018-S	7220	1378660	479300	06MAR86	0.27
FLSGW-0012	7221	1381000	483600	06MAR86	0.07 *
FLSGW-011T	7227	1377958	482271	06MAR86	0.03 ●
FLSGW-EMR-14	7228	1383957	476918	08MAR86	0.23
FLSGW-H-112	7317	1377460	479290	10MAR86	0.29
FLSGW-127H	7318	1385433	479115	10MAR86	0.10 *
FLSGW-EMR-16	7319	1384467	475625	10MAR86	0.43
FLSGW-H-113	7320	1376767	482146	11MAR86	0.10 ●
FLSGW-EMR-3	7321	1376759	485834	11MAR86	0.28
FLSGW-EMR-5	7322	1380460	484110	11MAR86	0.10 ●
FLSGW-EMR-6	7323	1383799	484863	11MAR86	0.41
FLSGW-EMR-19	7324	1380243	472495	10MAR86	0.03 ●
FLSGW-EMR-15	7325	1379666	474775	10MAR86	183
FLSGW-H-115	7326	1379932	472521	10MAR86	0.17 ●
FLSGW-EMR-21	7327	1381290	472450	10MAR86	4.09
FLSGW-EMR-18	7328	1382241	473619	10MAR86	0.02 ●
FLSGW-EMR-18	7329	1382241	473619	10MAR86	0.03 ●
FLSGW-EMR-10	7330	1377655	477575	10MAR86	0.08 *
FLSGW-EMR-12D	7426	1380011	475865	08MAR86	0.08 ●
FLSGW-EMR-12S	7427	1380011	475865	08MAR86	144
FLSGW-EMR-13	7428	1381660	476300	08MAR86	0.68
FLSGW-EMR-1	7429	1377310	487220	08MAR86	0.83
FLSGW-EMR-8	7430	1388520	481400	09MAR86	1.22
FLSGW-18S	8114	1378660	479300	26MAR86	0.15 *
FLSGW-18D	8115 A	1378650	479300	26MAR86	0.18 *
FLSGW-18D	8115 B*	1378650	479300	26MAR86	0.14 ●
FLSGW-T11	8116	1377958	482271	26MAR86	0.17 ●
FLSGW-EMR9	8117	1388610	479530	26MAR86	1.28
FLSGW-EMR14	8118	1383957	476918	26MAR86	0.81
FLSGW-EMR15	8119	1379666	474775	26MAR86	164
FLSGW-EMR15	8120	1379666	474775	26MAR86	179
FLSGW-2CW	8121	1403488	486368	28MAR86	0.50
FLSGW-H112	8122	1377460	479290	26MAR86	0.32
FLSGW-EMR17	8123	1379612	474015	26MAR86	41.20
FLSGW-A1	8124 A	1376540	487800	26MAR86	0.68
FLSGW-A1	8124 B*	1376540	487800	26MAR86	0.58
FLSGW-STATE16	8125	1372807	479621	26MAR86	0.20 ●
FLSGW-EMR3	8126	1376759	485834	26MAR86	0.05 *
FLSGW-STATE10	8127	1373125	490900	26MAR86	0.05 *
FLSGW-2CW	8128	1403488	486368	27MAR86	0.50
FLSGW-STATE8	8129	1374050	489025	27MAR86	0.02 *
FLSGW-1NH	8130	1365530	472790	27MAR86	0.35

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(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
(2) STATE PLANE - STATE PLANE COORDINATES
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT

TABLE 4.2
GROUND WATER SAMPLE TOTAL URANIUM CONCENTRATIONS

IT-5 - South boundary
" = KY
IT6

FIELD SAMPLE NUMBER	LABORATORY (1) SAMPLE NUMBER	STATE (2) PLANE E-W(FT)	STATE (2) PLANE N-S(FT)	SAMPLE COLLECTION DATE	TOTAL (3) URANIUM P CI PER LITER
FLSGW-A1	8131	1376540	487800	27MAR86	0.71
FLSGW-H123	8132	1377190	476500	27MAR86	0.27
FLSGW-STATE16	8133	1372807	479621	27MAR86	0.17 *
FLSGW-12-3	8134 A	1375070	476210	27MAR86	0.20 ●
FLSGW-12-3	8134 B*	1375070	476210	27MAR86	0.26
FLSGW-EMR3	8135	1376759	485834	27MAR86	0.07 *
FLSGW-STATE10	8136	1373125	490900	27MAR86	0.03 *
FLSGW-H120	8137	1384460	479500	28MAR86	0.07 *
FLSGW-STATE8	8138	1374050	489025	28MAR86	0.12 *
FLSGW-1NH	8140	1365530	472790	28MAR86	0.22
FLS-GWIT-4	8520	1384984	481528	10APR86	1.39
FLS-GW-IT-2	8521	1382997	479761	08APR86	2.05
FLS-GW-5B3	8522	1385018	481514	08APR86	0.19 ●
FLS-GW-EMR-8	8523	1388520	481400	11APR86	0.60
FLS-GW-IT-3	8524	1383292	481657	10APR86	0.25
FLS-GW-IT-3	8781	1383292	481657	10APR86	0.07 ●
FLS-GW5B3	8782	1385018	481514	10APR86	0.10 *
FLS-GWIT-4	8783	1384984	481528	10APR86	0.25
FLS-GWIT-2	8784	1382997	479761	10APR86	0.36
FLS-GWIT-5	8785	1382029	476752	10APR86	0.22
FLSGWIT-1	8786 A	1381391	478683	09APR86	4.15
FLSGWIT-1	8786 B*	1381391	478683	09APR86	3.87
FLSGWIT-5	8787	1382029	476752	09APR86	6.96
FLSSW-ITFH	8790	1379900	479820	09APR86	0.27
FLS-GW-EMR11	8791	1378970	476200	11APR86	1.08
FLS-GW-EMR12	8792	1380011	475865	11APR86	93.93
FLS-GW-EMR12	8793	1380011	475865	11APR86	0.22
FLS-GW-EMR-19	8794	1380243	472495	11APR86	0.11 *
FLS-GW-EMR-21	8795 A	1381290	472450	11APR86	0.25
FLS-GW-EMR-21	8795 B*	1381290	472450	11APR86	0.12 ●
FLS-GW-EMR-18	8796	1382241	473619	11APR86	0.07 ●
FLS-GW-IT-6	8838	1380706	476416	11APR86	9.92
FLS-GWIT-6	8839	1380706	476416	11APR86	0.05 *
FLSGW-EMR-8	8902	1388520	481400	22APR86	0.85
FLSGWEM-9	8903	1388610	479530	22APR86	0.90

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(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
(2) STATE PLANE - STATE PLANE COORDINATES

TABLE 4.3
SURFACE WATER SAMPLE TOTAL URANIUM CONCENTRATIONS

FIELD SAMPLE NUMBER	LABORATORY (1) SAMPLE NUMBER	STATE (2) PLANE E-W(FT)	STATE (2) PLANE N-S(FT)	SAMPLE COLLECTION DATE	TOTAL (3) URANIUM P CI PER LITER	WATER COURSE
FLSSW-0001-R	7212	1394000	481800	07MAR86	1.42	GREAT MIAMI RIVER
FLSSW-0002-R	7213	1387800	477100	07MAR86	1.60	GREAT MIAMI RIVER
FLSSW-0003-R	7214	1386400	467250	07MAR86	0.15 ●	GREAT MIAMI RIVER
FLSSW-0004-R	7215	1378100	467400	07MAR86	0.40	GREAT MIAMI RIVER
FLSSW-P5	7418	1380000	468200	09MAR86	4.18	PADDYS RUN
FLSSW-P1	7420	1377500	487200	09MAR86	0.16 ●	PADDYS RUN
FLSSW-P3	7421	1379500	476300	09MAR86	5.18	PADDYS RUN
FLSSW-P4	7422	1378100	472250	09MAR86	0.95	PADDYS RUN
FLSSW-P2	7423	1379400	477100	09MAR86	7.06	PADDYS RUN
FLSSW-P2	7878 A	1379400	477100	24MAR86	5.27	PADDYS RUN
FLSSW-P2	7878 B*	1379400	477100	24MAR86	5.12	PADDYS RUN
FLSSW-0004R	8109	1378100	467400	25MAR86	1.23	GREAT MIAMI RIVER
FLSSW-0002R	8110	1387800	477100	25MAR86	1.06	GREAT MIAMI RIVER
FLSSW-0001R	8111	1394000	481800	25MAR86	1.41	GREAT MIAMI RIVER
FLSSW-0003R	8112	1386400	467250	25MAR86	0.13 *	GREAT MIAMI RIVER
FLSSW-P4	8904	1378100	472250	22APR86	5.55	PADDYS RUN
FLSSW-P5	8905	1380000	468200	22APR86	1.03	PADDYS RUN

(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
(2) STATE PLANE - STATE PLANE COORDINATES
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT

TABLE 4.4
SEDIMENT SAMPLE TOTAL URANIUM CONCENTRATIONS

FIELD SAMPLE NUMBER	LABORATORY (1) SAMPLE NUMBER	STATE (2) PLANE E-W(FT)	STATE (2) PLANE N-S(FT)	SAMPLE COLLECTION DATE	TOTAL (3) URANIUM P CI PER GRAM	WATER COURSE
FLSSW-0002-R	7222	1387800	477100	07MAR86	0.80	GREAT MIAMI RIVER
FLSSW-0004-R	7223	1378100	467400	07MAR86	0.80	GREAT MIAMI RIVER
FLSSW-0003-R	7224	1386400	467250	07MAR86	0.44	GREAT MIAMI RIVER
FLSSW-0001-R	7225	1394000	481800	07MAR86	0.96	GREAT MIAMI RIVER
FLSSW-P5	7419	1380000	468200	09MAR86	0.70	PADDYS RUN
FLSSW-P2	7424	1379400	477100	09MAR86	0.76	PADDYS RUN
FLSSW-P2	7425	1379400	477100	09MAR86	0.76	PADDYS RUN
FLSSW-P1	7875	1377500	487200	24MAR86	0.82	PADDYS RUN
FLSSW-P3	7876	1379500	476300	24MAR86	0.96	PADDYS RUN
FLSSW-P4	7877	1378100	472250	24MAR86	1.44	PADDYS RUN
FLSSW-P4	8113	1378100	472250	24MAR86	0.24	PADDYS RUN

(1) 'A', 'B' - REPRESENT DUPLICATE ANALYSES
'B*' - REPRESENTS ANALYSES DERIVED FROM A SPIKE
(2) STATE PLANE - STATE PLANE COORDINATES
(3) TOTAL URANIUM CONCENTRATIONS ARE BASED ON DRY WEIGHT

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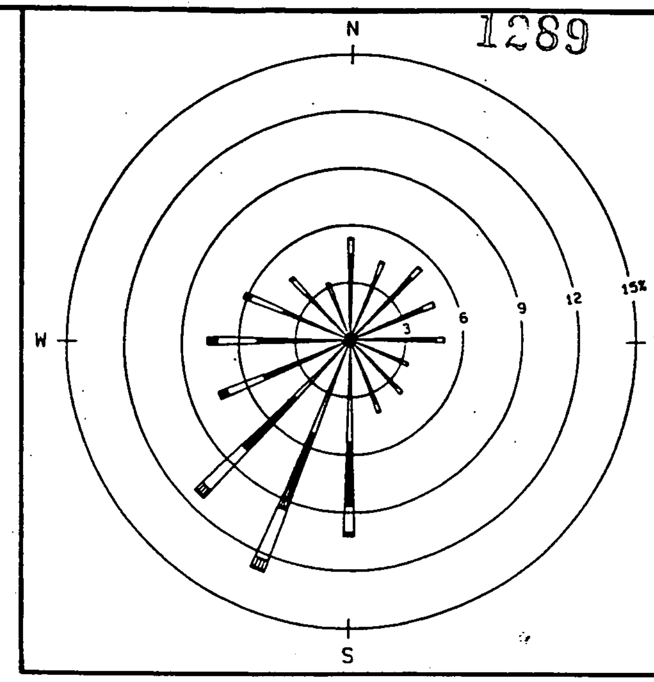

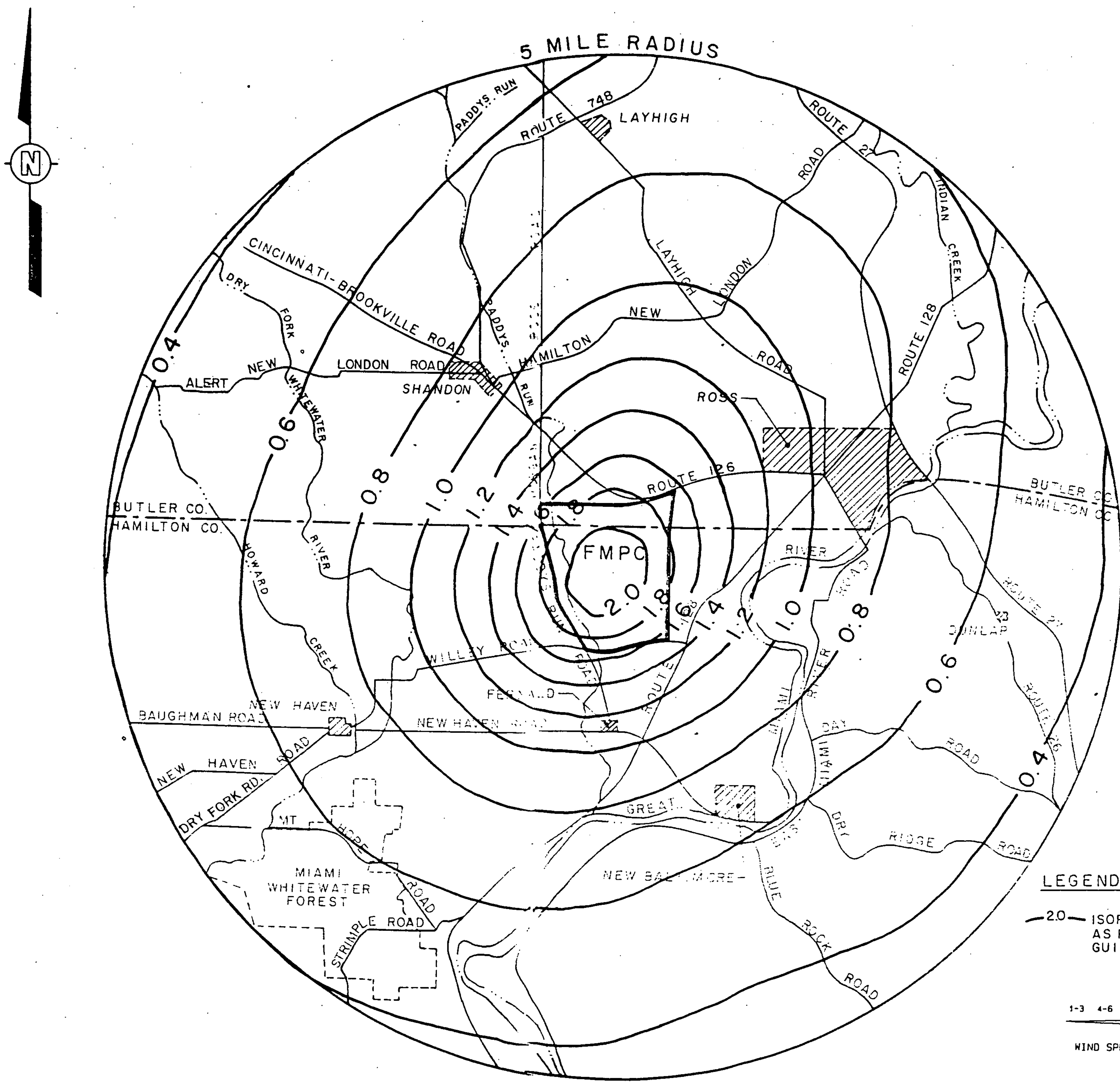

SCALE

0 6000 12000 FEET

LEGEND:

—2.0— ISOPLETHS EXPRESSED AS PERCENT OF U.S. DOE GUIDE

1-3 4-6 7-10 11-16 17-21 >21

WIND SPEED CLASSES (KNOTS)

FIGURE 2-6

ANNUAL AVERAGE URANIUM CONCENTRATIONS IN AIR FOR THE PEROID(1952-1984) EXPRESSED AS A PERCENTAGE OF U.S. DOE GUIDE FOR INSOLUABLE URANIUM PARTICLES IN AIR (DOE ORDER 5480.1A)

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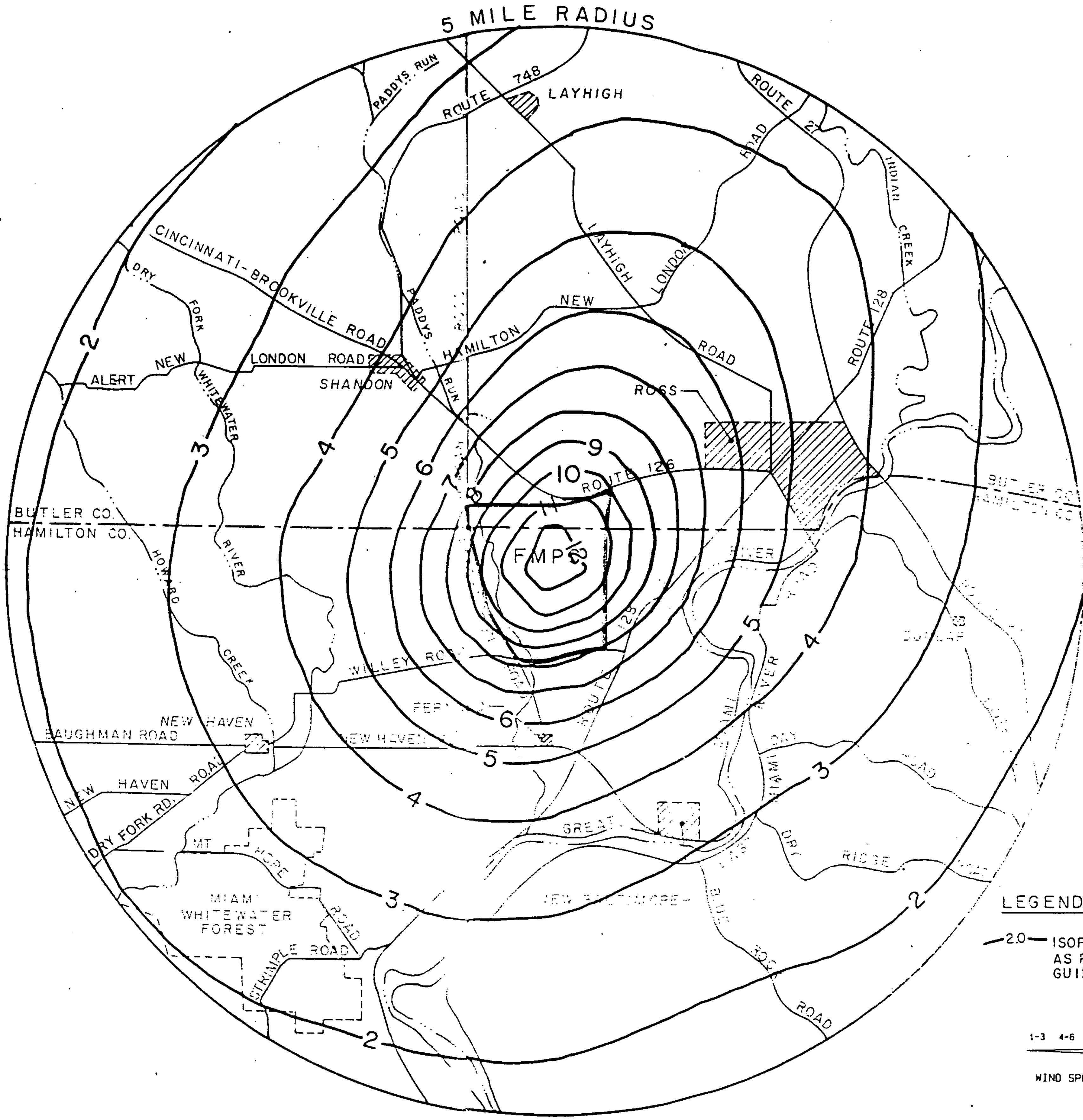
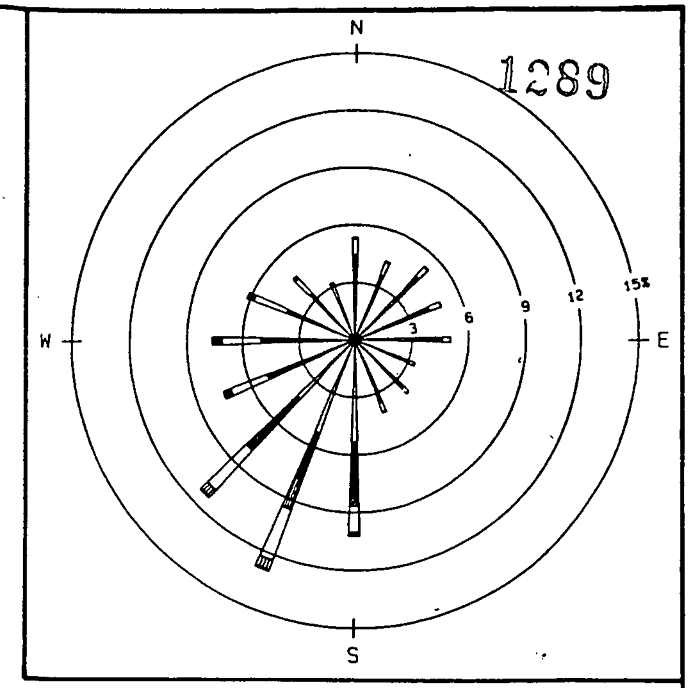
18B 50%

1289





S C A L E
0 6000 12000 FEET

LEGEND:
2.0 ISOPLETHS EXPRESSED AS PERCENT OF U.S. DOE GUIDE

1-3 4-6 7-10 11-16 17-21 >21
WIND SPEED CLASSES (KNOTS)

FIGURE 2-7

ANNUAL AVERAGE URANIUM CONCENTRATIONS IN AIR FOR 1955 EXPRESSED AS A PERCENTAGE OF U.S. DOE GUIDE FOR INSOLUABLE URANIUM PARTICLES IN AIR (DOE ORDER 5480.1A)

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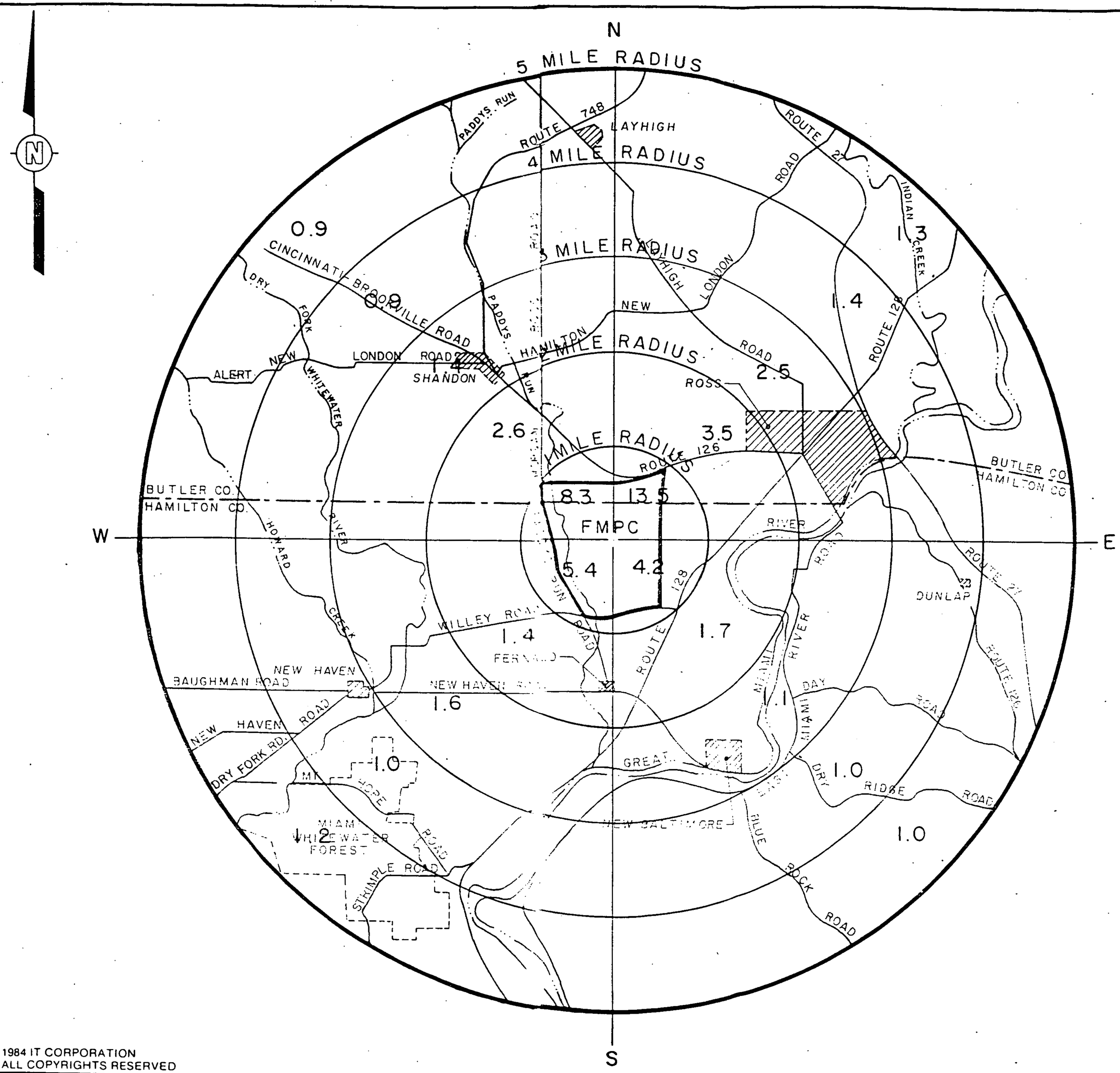

SCALE

0 6000 12000 FEET

FIGURE 3-3

MEDIAN CONCENTRATION
pC_i/g OF TOTAL URANIUM IN
SOIL BY QUADRANT AND DISTANCE
FROM THE FMPC SITE

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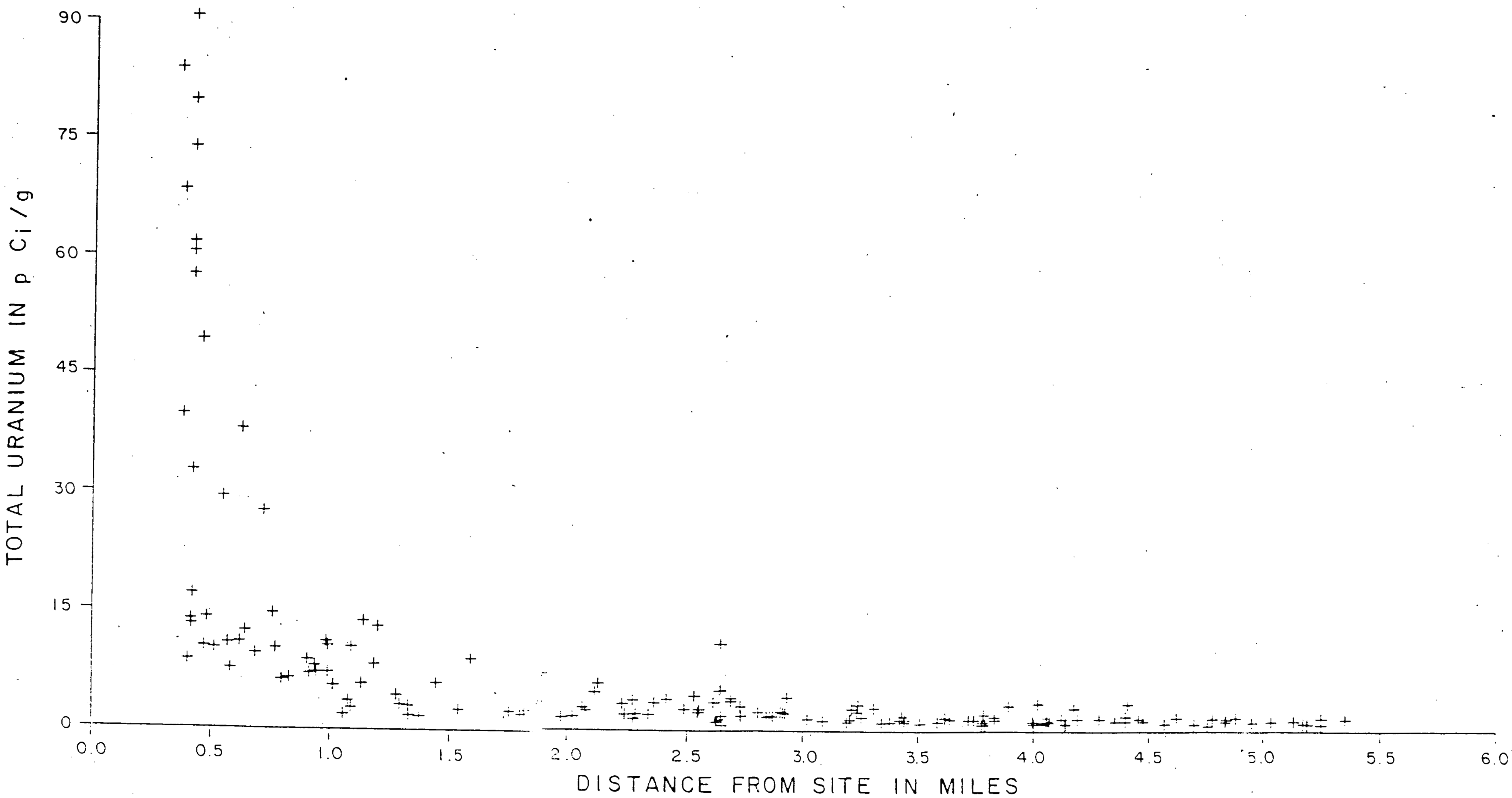

FIGURE 3-4

TOTAL URANIUM CONCENTRATION (pC_i/g) IN SOIL VERSUS DISTANCE FROM FMPC SITE FOR NE QUADRANT

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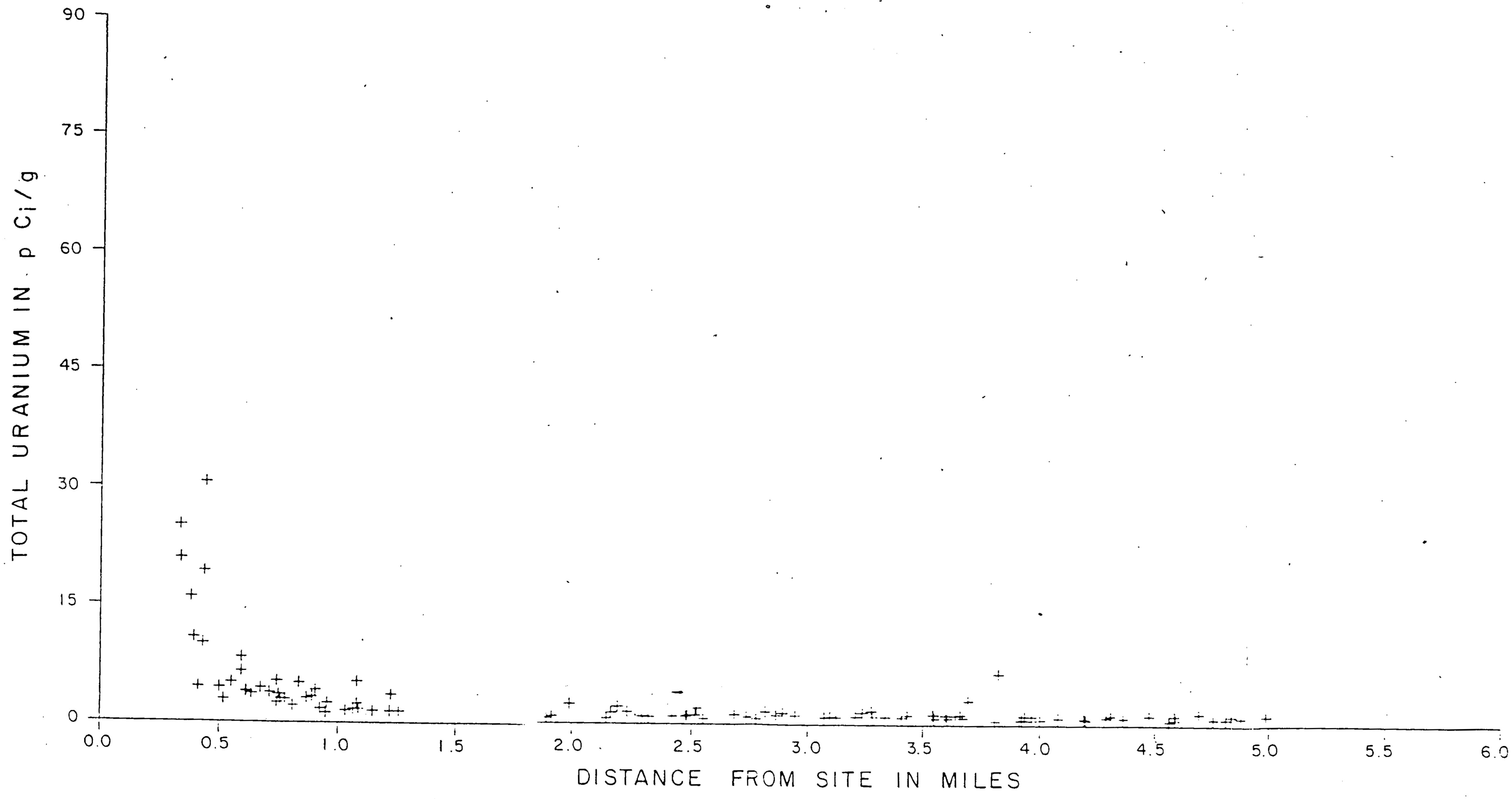

FIGURE 3-5

TOTAL URANIUM CONCENTRATION (pCi/g) IN SOIL VERSUS DISTANCE FROM FMPC SITE FOR SE QUADRANT

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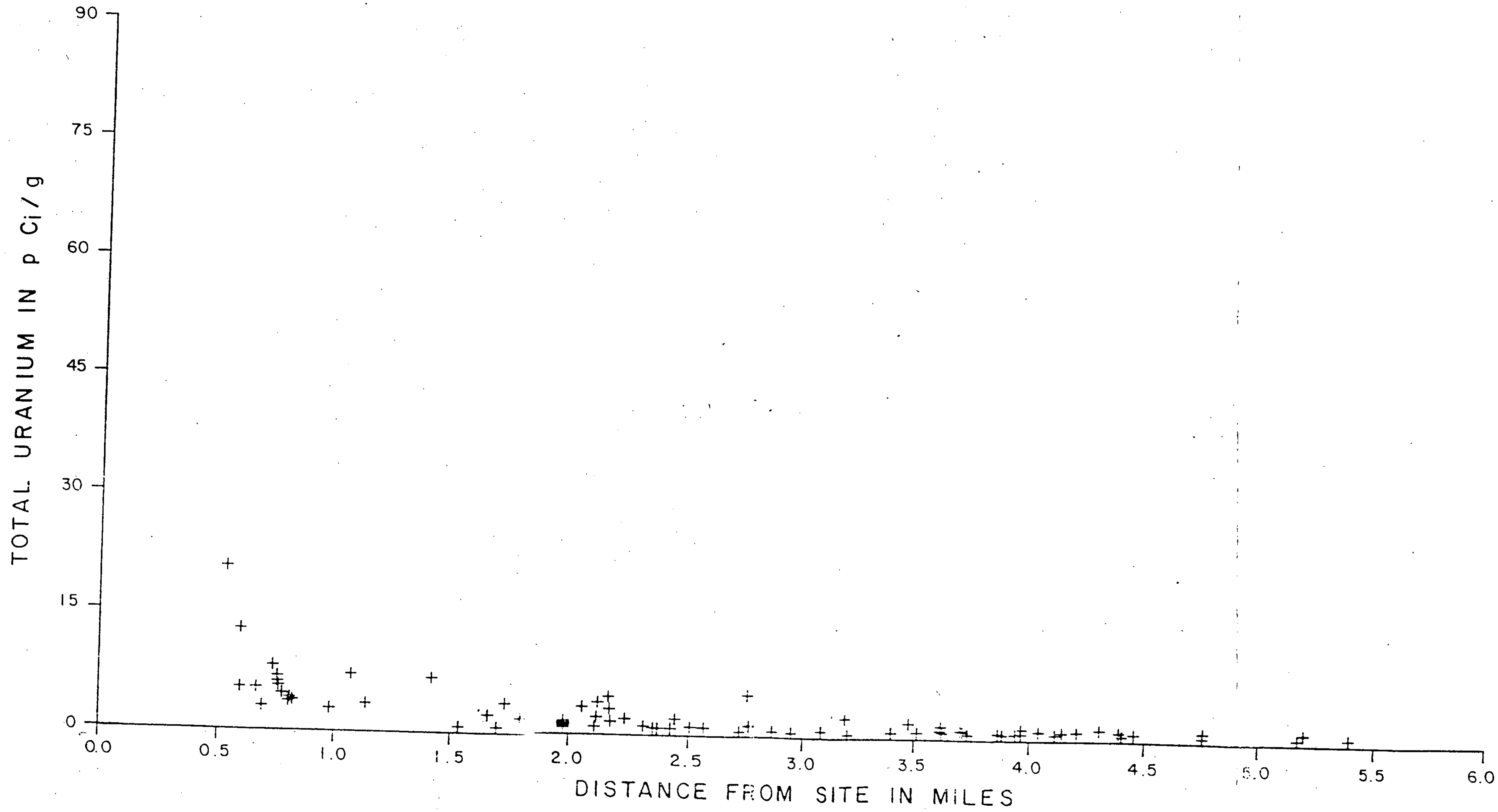

FIGURE 3-6

TOTAL URANIUM CONCENTRATION (pCi/g) IN SOIL VERSUS DISTANCE FROM FMPC SITE FOR SW QUADRANT

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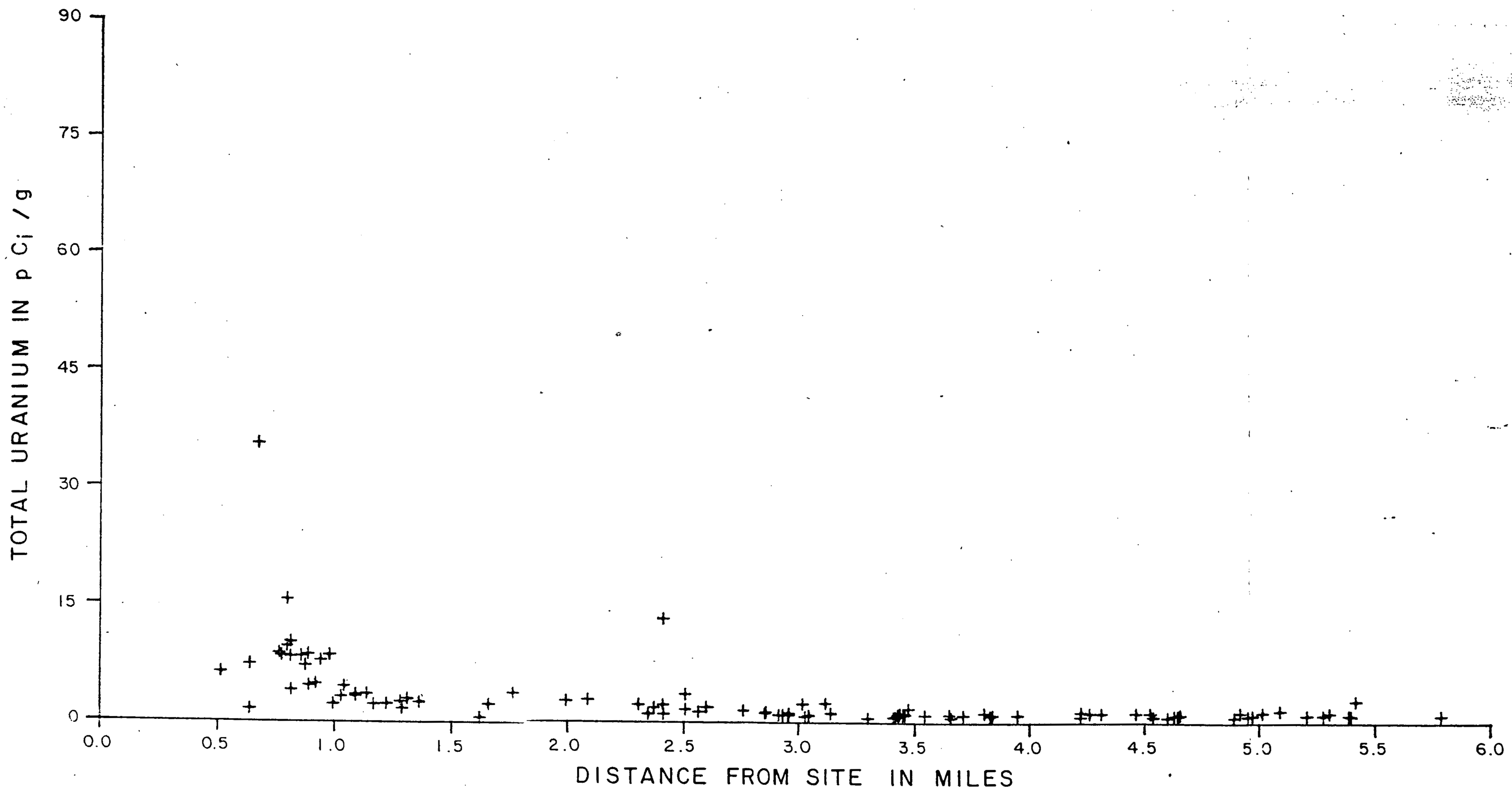

FIGURE 3-7

TOTAL URANIUM CONCENTRATION (pC_i/g) IN SOIL VERSUS DISTANCE FROM FMPC SITE FOR NW QUADRANT

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